Médical Lib SEP 25 1924

Subscription Price:
United States and Canada, $6.00 Per Year. Great Britain, 25 Shillings; Single Copies, 3 Shillings.
Foreign, $6.00 Per Year; Single Copies, 75 Cents.

VOLUME VI SEPTEMBER, 1924 NUMBER 5

THE JOURNAL OF INDUSTRIAL HYGIENE

AND ABSTRACT OF THE LITERATURE

OFFICIAL ORGAN OF
THE AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS

EDITOR, UNITED STATES
DAVID L. EDSALL, M.D., S.D.

HONORARY CONSULTING EDITOR
THOMAS M. LEGGE, M.D., D.P.H.

EDITOR, GREAT BRITAIN
E. L. COLLIS, M.D., M.R.C.S.

Devoted to the papers read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 9 and 10, 1924

Annual Address of the President of the American Association of Industrial Physicians and Surgeons

Medical Provisions of Workmen's Compensation Laws

The Sanitary Problems of the South

Rehabilitation of the Physically Handicapped

The Industrial Physician and Preventive Medicine

Silicosis: A Modern Factory Health Hazard

Nerve Injuries

PUBLISHED MONTHLY BY HARVARD MEDICAL SCHOOL

EDITORIAL AND BUSINESS OFFICES : : 55 VAN DYKE STREET, BOSTON 17, MASSACHUSETTS
GREAT BRITAIN : : INDUSTRIAL WELFARE SOCIETY, 51 PALACE STREET, WESTMINSTER, S. W. 1

Entered as second-class matter, at the Post Office at Boston, Mass., under Act of March 3, 1879. Published Monthly.
Copyright, 1924, by Harvard Medical School.

THE JOURNAL OF INDUSTRIAL HYGIENE

PUBLISHED MONTHLY

VOLUME VI SEPTEMBER, 1924 NUMBER 5

ANNUAL ADDRESS OF THE PRESIDENT OF THE AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS*

LOYAL A. SHOUDY, M.D.

Bethlehem Steel Corporation, Bethlehem, Pa.

IN speaking to you today I am fully conscious of my own shortcomings both as your executive officer and as an industrial physician and surgeon. This field of ours, which some of our friends think so small and unimportant as not to be deserving of classification as a specialty in medicine, has grown so large and its leads have become so important that after spending ten years in the work I realize that I am just beginning.

Our Association is nine years old—and many of you no doubt feel that we have not accomplished much during this time. I thought so too, until I looked around. The trouble is that you must look around because the results are scattered. All the reports that have been worked out, all the papers that have a direct bearing on the work, and all the forms that have been adopted are well worth while and they should be collected at some headquarters to which members of the Association could apply when in need of information.

In the beginning it was the intent to keep together the various associations directly interested in industrial medical and health work. The idea was that the various industrial states would develop state locals of the American Association of Industrial Physicians and Surgeons. I personally know that much good came from the Pennsylvania Association as carried on by Dr. Patterson in close relation with the State Department of Labor and Industry. Since Dr. Patterson's retirement this association has not carried on as it should. I have the promise, however, of the present head of the department that the former relations may be continued and I assure you that the Pennsylvania Association will again assume

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 9, 1924.

its former position for the advancement of industrial medicine in the commonwealth. New York, Ohio, and Illinois have state industrial associations and these should be members of the American Association of Industrial Physicians and Surgeons. There are also in existence two or three city locals. More should be encouraged and all should bear some relation to this Association. I am pleased to note that in Philadelphia there is a section which bears a direct relation to the various other branches of medicine and surgery. It should be possible to make some arrangement whereby one payment of dues would cover all branches.

I am aware that many of you feel that the Association should do more for its members. I agree with you in this but at the same time I feel that the members should do more for the Association. Personally I am not discouraged with the progress that we have made. It has taken time to find the place for the work and to learn its true value. During the past nine or ten years the problems of industrial medicine have reached an importance in industrial life far greater than most of us thought possible. The human relations of industry, the relations of the doctor to labor, as visioned by Geier, are now an accepted part of our work. Our influence has been felt in all lines of industry and in the various agencies of public health. We have not time to worry over so-called recognition; we are satisfied with the recognition from the men in industry who appreciate our efforts to give them better working conditions, better surgical and medical care, and a better understanding of themselves and their jobs.

As individuals we have produced a certain amount of valuable data. At present, however, most of us are too busy to devote sufficient time to the work of the Association so that many problems might be solved and all existing data be edited and made available. The work of the industrial physician is so woven into the industry that he finds himself content working on and on and not pushing out to give the real value of industrial medicine to the general medical world. An exception to this is the work of Dr. Clark at the Norton Plant. I believe that a paid secretary or executive officer in the Association would solve this difficulty. Various industries would, I believe, contribute to our needs if the problems and aims were properly presented. I sincerely hope that the incoming board will be able to offer a solution.

There is no denying that many of us see too much of one phase of our work and have a tendency to slight the other. The interests of those of us who are in large factories where accidents need surgical attention are naturally surgical. To my mind, the questions to be solved are: What are the health hazards of industry? What processes, what occupations of your industry are hazardous to the worker's health? What are you doing to make your plant a safe health plant? I believe that the safety engineer is in advance of us in his work and he is wise enough to use us to advance safety. A glance at the lost-time sheet in most any industry will show you that the amount of time lost through sickness is far greater than that lost through accident.

Not enough of us are interested in the problems of industrial health and the prevention of plant sickness. I realize that the surgical end is the easiest to "sell" to the employer, because he can see the results; at the same time I know that the health and medical features of our work are not sufficiently

urged to place them where they belong in the factory health program. The process of education must be carried on and we must be the teachers. Factory health and community health are so closely related that they cannot be separated but must be carried on together. The plans for doing this will vary with the community and the conditions to be met but the industrial physician must be ever ready to further any good plan of community health.

In 1920 Mock called our attention to medical economics, and what he said is as true today as it was then. Along this line we can report progress. We have made some advancement in industrial health and reclamation, but not enough. As physicians in industry we should be the advisers on all health problems which arise in and grow out of industry, such as the following:

Heat, its effects on the body, eyes, etc.
Carbon monoxide, benzol, all gases and fumes.
Specific poisons: lead, arsenic, antimony, etc.
Industrial aspects of the cardiac: Who should work and where?
Skin diseases and their connection with the work performed.
Cancer: Has it any direct relation to industry?
Fatigue, causes of, and means of lessening.
Respiratory diseases: Are they traceable to industry? Dusts?
Dental problems and their bearing on the general condition of the plant.
Eye, diseases of, and protection.
Posture: Aim should be to give the greatest comfort at work and conform with the requirements of health.

These are all problems to which we should contribute our practical findings in order to improve working conditions and to make for the better health of industry and the community. These are problems which require research in industrial physiology. Then there are other problems which bear directly on plant relations, such as health, accidents, compensation, relief and benefits, pensions, hospitals, and plant sanitation, ventilation, and illumination.

Under health comes the question of physical examination, the starting point of all health relations with the plant. We should have some definite work on physical examinations, some definite form and outline as to what should be done in all cases, sufficiently elastic to meet the requirements of any industry. I think that you will agree with me that the physical examination can be made the worker's introduction to the plant. The re-examination idea should be encouraged and the "Get examined on your birthday" slogan is a good reminder.

If you cannot establish the clinics which you feel should exist, then through your work you can gain the confidence of the men so that they will come to you for health directions. And let me say to you here that your relations with the men—their respect for and confidence in you—will be what you, as a man, make them. Selby has voiced this to you in "While all this is not a function of medicine, listening to other folks' troubles has become an obligation to physicians, whether in the home or in the factory. It is a tribute which the whole world pays the physician." And Geier is right when he tells you that the industrial physician must be both priest and doctor; and again when he says that "the industrial health department can be made the great human laboratory that will help to refine out the dross and hasten the day of industrial betterment, the ultimate day of a better understanding." The human ills of industry are mainly due to a lack of points of contact between man and master. The doctor is a point of contact.

Accidents as a problem have a direct effect on our work. Knowing the cause is many times half the care. We have a report on first aid and care for the injured which will appear soon.

In the interpretation of compensation laws we must lend our knowledge to both the employer and the employee. Many little disagreements may be adjusted by a tactful doctor. Dr. Rector will tell you why we should be more interested in this work. A perusal of the Conference Board report containing a digest of the various state compensation acts will convince you that help is needed.

For the relief and benefit association the doctor may serve as a medical adviser, help in the classification of diseases, and read out of the report the health of the plant.

Help to make the local hospital as complete as is possible to do the community work. In cases of injury see that the correct cause is reported, and in cases of sickness assist by supplying details as to the kind of work the man is doing.

In pensions ours should be the examination and recommendation as to the man's general physical condition.

There are, of course, many other lines wherein the physician in industry may help in the great work of the industry. I believe that industry wants to do what should be done to educate and protect the workers. The interest shown by industry in the surgical and accident work leads me to believe that we will find the same response in health work, once we make clear the needs and solution of the problems. Industry has backed the relief and benefit associations and the employees are interested in them; to me this is proof that they are interested in plant sickness. It remains but for us to bring forth the proof that prevention is better than relief.

Is there any better place to work out community and plant health than in many of our mining camps?

It is not necessary for me to tell you of the functions of the physician in industry; read Dean Marquis' paper from the Detroit session. Nor is it necessary for me to tell you the qualifications of the physician in industry; they, too, have been discussed. I do want to say to you again, however, that there are many problems in industry which we should solve and others which we should help solve. Much has been written on various subjects allied to medicine in industry, but what is needed now is a way for comparison—statistics of sickness in the various industries, comparable statistics under a standard form so that we may read out of them the health of the working people. Can this be accomplished through some existing agency such as the United States Public Health Service?

In 1922 to 1923 Dr. Ford outlined certain problems and aims for the Association, some of which have been answered. Dr. Giddings described the relation of the industrial physician to the family physician, and Dr. Schram told you that the physician should go out into the plant. We adopted a report on first aid. We are all working on plant education along medical lines. Health service to the small plants has been answered. We have made progress in spreading the value of medicine and health with the Associated Industries. This has been accomplished through the Conference Board, the National Safety Council, and other agencies which are manned by our members. We are slow, however, in producing good papers and scientific data. The Journal cannot publish what it does not receive. More-

over, we do not pay enough attention to the making of good medical compensation laws.

Allow me to ask you to use discretion in endorsing certain medical preparations of doubtful or cure-all type—preparations guaranteed to prevent infection, cut lost time, etc. Try to prevent your industry from endorsing medicaments of unknown composition and doubtful value.

In concluding, I wish to emphasize the following things which I believe we should do:

1. Adopt the standard fracture form of the American College of Surgeons for the reporting of all fractures.

2. Make plans for the employment of an Executive Secretary.

3. Appoint a committee to work out a plan whereby we can bring together the various State Industrial Medical Associations and the American Association.

4. Appoint a committee to work out a standard form for physical examination.

5. Support THE JOURNAL by supplying good papers for publication.

I am satisfied that we have made some progress since the days when Mock dreamed of our existence and I have faith enough to say that we will carry on to the end that the worker's life will be prolonged and happier through our efforts.

MEDICAL PROVISIONS OF WORKMEN'S COMPENSATION LAWS*

FRANK LESLIE RECTOR, B.S., M.D.
Secretary, Conference Board of Physicians in Industry, New York

ACTUAL MEDICAL PROVISIONS

IT was my privilege during the past two years to be engaged in a study of workmen's compensation laws of the United States, with particular reference to their medical provisions, and of the decisions of industrial commissions and courts on medical problems coming before them for consideration. The results of this study are given in Research Report No. 61, National Industrial Conference Board, New York, to which I refer you for detailed facts regarding the problems discussed in this paper.

Forty-two states now have workmen's compensation laws upon their statute books, and the earliest effective law, that of Wisconsin, has been in operation since May 3, 1911. In general, these laws have been patterned after a similar law in England, and much of the phraseology has been borrowed from English sources.

In making the study referred to above, it soon became apparent that provisions having to do with medical applications had been incorporated in these laws without much consideration of their operation and ultimate effect upon the employer, the employee, the medical profession, or the community.

As to the administration of these laws, we find that without exception they are administered by individuals without medical training. Every compensation case is a medical case, and under the workings of the law by far the largest number of these cases are entitled to receive only medical, surgical, and hospital care. They are not of sufficient duration to entitle the workmen to cash benefits. Under such conditions it would seem only reasonable that medical opinion should be well represented upon the industrial boards of the various states, but we find that only fifteen states out of the forty-two have a physician attached to the board's staff in any other position than that of an impartial or examining physician. In these fifteen states the medical personnel consists of one or more physicians, many of whom are employed on a part-time basis, who act in an advisory capacity to the board, adjust disputed fees of attending physicians, and at times make physical examinations and perform other similar functions.

Practically all the states provide for the appointment of impartial physicians who make physical examinations of claimants upon request of the board or, in some cases, of one or both interested parties, and who are paid a fee of from $5 to $10 for such examinations. In some of the states these fees are paid by the state, in others by the employer, and in still others by both the employer and claimant. In Wyoming, where the compensation law is administered by the courts, the fees of the impartial physician are taxed as costs in court action.

The term "physician" is variously defined under certain laws as one authorized to practise medicine in his state and in good professional standing. Other state laws specify that the examining physician must be "duly qualified," and in others he must be "com-

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 9, 1924.

petent to treat the case," "a reputable practising physician or surgeon," "a duly licensed physician," or "of good standing and ability."

Practically all the states require the employer to furnish medical, surgical, and hospital service for his injured employees for a varying length of time. The tendency at present seems to be to make this period unlimited. The limitations on the fee allowed the attending physician are also being removed, as practical experience shows it to be both economical and advisable to grant the injured workman all medical service needed to relieve and, if possible, cure his condition, regardless of the time necessary to accomplish this and the fees involved. In addition to providing medical, surgical, and hospital service, several of the laws state that nursing service, under restrictions, medicines, supplies, crutches, mechanical aids, artificial limbs, and other apparatus and appliances shall be furnished at the expense of the employer. One state includes spectacles, and another includes dental work.

In five states only, the injured workman has free choice of the physician to attend him, while in two others the employee may choose his physician from a panel submitted by the employer. In nine states a change of physician may be granted by the board upon proper showing, while in other states the employer is charged with the responsibility of furnishing the attending physician and the employee can select his physician only upon the employer's refusal, neglect, or inability through emergency to do so.

In five states negligence or malpractice of the physician is compensated by the board as an aggravation of the original injury, and in four states the employee may sue the attending physician for damages in malpractice cases.

Where employees refuse to accept medical service offered by the employer and insist on their own physician, or where they persist in insanitary or injurious practices tending to imperil or retard their recovery, the law in nine states provides that the commission or board may at its discretion reduce or suspend compensation. In five other states the employer is relieved of all liability where the employee refuses medical treatment offered, and in four other states compensation is suspended during refusal of treatment. In three states, when death ensues from refusal of treatment, no compensation is granted.

As an evidence of the lack of proper consideration of medical questions, we find that the anatomic descriptions in many of the laws are peculiar, to say the least. In the description of different parts of the extremities subject to dismemberment we find that in certain laws the hand ends at the wrist while in others it extends to the elbow; likewise, the foot extends to the ankle or to the knee; the balance of the extremity in either case is the arm or the leg, and its limitations vary in accordance with those noted for the hand or foot. In only one state are the true anatomic divisions of the extremities noted in the law.

In only one state, New Mexico, does the law provide that physical examinations of workers previous to injury may be required by the employer. Practically all the states provide for physical examination following the injury by either the employer's physician or an impartial physician or, at times, by both.

In nine states, the commission is empowered to order an autopsy to determine the cause of death, and in three

other states the commission may require an autopsy although this authority is not specifically mentioned in the act. In the other states permission for autopsy is usually obtained from the relatives or dependents of the dead workman.

In twenty states personal injury as defined in the law does not include disease or infection unless resulting directly from the injury, while in other states all the results of aggravation of latent diseases are compensated. The records of the commissions in this latter group are replete with instances of compensation granted for diseases that are far removed from any connection with the original injury, but the precedent having once become established, it is extremely difficult for the administrative bodies to decide in any other manner.

One of the more far-reaching effects upon medical practice brought about by the compensation law is that the old established principle of privileged communication has been abrogated or greatly modified. The laws of practically all states specify that physicians who treat or examine claimants must upon request testify as to their findings before the commission or courts.

While not specifically intended to do so, the enactment of workmen's compensation laws has in effect introduced a new element into the relation of the physician to the community. These laws make mandatory the providing of necessary medical, surgical, and hospital service for injured workers. They also directly limit the expense for which the employer is liable for such treatment or empower the administrative boards to pass upon all such fees. While the law requires that medical service shall be furnished by the employer, as a matter of course, this requires the services of a physician. Thus a new problem is introduced into the activities of the medical practitioner. Being the only one in the community capable of rendering such service, there is imposed upon him, at least by implication, the duty of contributing his skill and experience to the treatment of such cases. Some suggest that physicians are under no greater responsibility to furnish service under the compensation laws than they are in their private practice. In other words, they may refuse to treat compensation cases. Once having accepted the responsibility of such treatment, however, they become subject to the requirements of the laws and thereby find their relation to their patients altered in certain respects.

Official schedules of fees for the treatment of compensation cases have been adopted in thirteen states. These schedules vary, depending upon the locality to which they apply. The Utah schedules are probably as high as or higher than those in any other state. The physicians operating under the Utah law are more fortunate in many respects than their brother practitioners in other localities. In a number of states having no official fee schedules, the law stipulates that such fees are limited to charges prevailing in the same community for similar treatment of persons of a like standard of living. In other states the fees are fixed or regulated by the board. In still other states the board has no jurisdiction over this question except in case of disputed bills, when it has the power of settlement. The Texas law, which is one of those providing for the regulation of fees by the board, states that the board should consider the increased security of payment afforded by the act when determining the reasonableness of such fees.

J. I. H.
Sept., 1924

Four states have had, for some time, specific schedules of occupational diseases for which compensation is paid. At the legislative session just closed, New Jersey was added to this list. The schedules in New York and Minnesota are practically identical and were taken in large part from the list found in the British law. Illinois compensates for only a few diseases, while Ohio has a slightly larger number on its list. The New York and Minnesota laws contain the phrase "or sequelae," following a number of the disease conditions listed, while Ohio omits any reference to sequelae. In addition to the compensation for specific diseases, a large number of other diseases have been compensated as the result of an accident. Among such diseases we find that practically all the infectious and contagious diseases have been compensated, as well as nephritis, rheumatism, sciatica, pericarditis, and many others. Injuries resulting from forces of nature, such as frost-bites, sunstroke and heat prostration, lightning, and tornado, have also been compensated. With regard to latent diseases, cancer and other morbid growths, heart disease, tuberculosis, diabetes, goiter, some forms of insanity, and other unusual conditions have been awarded compensation.

The consideration of eye injuries and the degree of defective vision resulting from such injuries has been the cause of much controversy among medical men and industrial boards. Four different tables for the estimation of degree of defect in eyes where vision is below normal are in use in different states. A number of states have adopted no table but rely upon estimates of disability furnished by physicians testifying before the board.

The consideration of hernia is also one with a history of much controversy, although the tendency seems to be at this time to throw more and more upon the claimant the burden of proving that his hernia was received in the course of and as a result of his employment. Some states, notably New Jersey, have made strict provision in this regard, and it is necessary for the claimant to present indisputable proof that his disability was due directly to his employment. The laws of some states are mandatory regarding the treatment of hernia by radical operation; for instance, the Oregon law provides that a person claiming contraction of hernia in the occupation must submit "forthwith" to radical operation for cure, and in the event of his refusal, neither he nor his beneficiaries can claim compensation benefits.

Having sketched hastily the major medical provisions of the laws and having pointed out some of the difficulties in the provisions of these laws, I wish to consider for a moment whether it would not be possible to adopt uniform medical provisions. The fundamental principle of these laws is to provide some sort of benefit for the workman who may be so unfortunate as to become injured during his employment. The financial benefit which he is to obtain has been fairly well determined and standardized but the medical benefit to which he is entitled, and which, in many cases, is ultimately far more important than the financial payments, has been given much less consideration than its importance deserves. From my study of workmen's compensation laws and the hundreds of decisions of industrial commissions and courts, certain conditions suggest themselves which I believe warrant the serious consideration of all those interested in the application of these laws, and which, if embodied in them, would go far toward

eliminating the conflicting conditions that now are so evident.

Suggested Medical Provisions

There should be at least one member of the compensation board who is a physician, and he should act as medical director. To discount any political influence which might seek to enter, the medical director should be appointed from a group of at least three physicians proposed by the state medical society as being qualified for the position. He should have the benefit of a consulting staff of recognized specialists appointed from a group proposed by the state medical society to advise the board regarding the treatment of cases, the estimation of degree of defect, and other matters touching upon medical questions. This consulting staff should also be non-political, and its members should be paid for the actual time spent in compensation work.

In addition to the medical director and consulting staff, examining physicians should be appointed by the board to make examinations of injured workers. Their appointment should be made on recommendation by the consulting staff on the basis of their scientific qualifications. Their fees and expenses should be paid by the board and not by either interested party.

In order to overcome the possibility of quacks and charlatans calling themselves doctors, only licensed graduates of recognized medical schools in good professional standing should be permitted to treat compensation cases, and all varieties of treatment should be given under supervision of such physicians.

Medical fee schedules when adopted should conform to the average charges for like work in the community. Where there is no official schedule or where the fee is in dispute, the board should be empowered to decide the matter.

To define the limits of the amount and kind of medical aid to be rendered, I would suggest that such treatment should include all necessary medical, surgical, and hospital care and attendance, and in addition such supplies and appliances as may be needed to relieve and cure the injured worker. The attending physician should be given the right to say what constitutes necessary medical, surgical, and hospital care and attendance; when his opinion is questioned, the medical director and the consulting staff of the board should have the power to give a final opinion.

In many types of injury the exact condition of the employee cannot be determined except by repeated physical examinations. In order to provide the greatest amount of justice to all interested parties, an examination of the injured worker should be made immediately following the injury or at such time thereafter, on application of the employer or the employee, as the board or consulting staff determines to be necessary. Any expense to the worker of such subsequent examinations should be borne by the party requesting them.

As under a majority of the compensation laws the employer is charged with the responsibility of furnishing medical, surgical, and hospital care, the choice of physician to treat the case should rest with the employer or be made by the employee from a representative group of physicians in the community provided by the employer. Employees should be granted a change of physician only on proper showing of employee or employer to the medical director of the board. Insurance companies should be permitted a change of physicians only on proper showing to

the medical director of the board. This provision is suggested because some commissions report that under the provisions of the law they are without power to prevent insurance companies from forcing an employee to drop the services of a physician whom he may have secured in an emergency and who may be giving satisfactory treatment for a physician of their own choosing.

In order to safeguard properly all interested parties, copies of the findings of examinations by examining physicians should be furnished forthwith to such parties or their representatives. Reports of physicians, other than examining physicians appointed by the board to examine or treat compensation cases, should not be submitted as evidence at hearings, nor should such physicians be permitted to testify as to their examination or treatment unless medical representatives of the other interested party or parties have reasonable knowledge beforehand of the facts contained in the report to be made or of the testimony to be given.

When an employee refuses further treatment by the attending physician or changes physicians voluntarily, the employer should not be held liable for further medical cost, compensation, or condition of the employee, but upon request and notice to the board should have the right to make an examination to determine physical status of the injured at the time the change takes place.

I am unable to see why it is necessary to establish new anatomic definitions in compensation laws and should therefore suggest that the usual definitions of hand, forearm, arm, foot, leg, and thigh be incorporated in the laws. This would greatly facilitate comparisons of awards in dismemberment cases. Compensation for amputation of a member should be based on the function of the remaining part and not on the amount of tissue removed. The surgical point of election familiar to all physicians doing amputations should be considered and taken advantage of in all compensation cases as well as in private practice. The methods followed by some commissions in allowing an increasing amount of compensation for increasing amounts of tissue removed regardless of whether or not the remaining stump will be as useful as if a larger amount of tissue had been removed, are not to be commended from the standpoint of future possibilities of function.

Provision should be made for autopsy in all fatal cases when desired by either interested party or the board. Autopsy costs should be borne by the party requesting it.

Compensation for disease alleged to be due to an accident should be granted only on proof of the direct causal connection between the accident and the onset of the disease, such proof to be based on known facts regarding the case and the best experience of the medical profession in the treatment of similar conditions. Compensation experience in some states shows that many disease conditions that have had only a remote or casual connection with the occupation are considered as being directly responsible for it. In some cases these decisions have been sustained by the courts and in other cases overruled. Compensation for aggravation of latent or preexisting diseases, particularly if known to the employee at the time of his entering employment or before sustaining the injury for which compensation is claimed, should be limited to the degree of disability caused by the present employment or injury. If necessary to provide compensation for such conditions, as in the case of total disability, provision should be made for the state

or previous employers to contribute proportionately to such payments.

In the estimation of the percentage of visual defect due to injury, the age and occupation of the employee should be considered. All three functions of vision should be weighed in their proper relations in arriving at compensation, and each case should be decided upon its merits rather than according to a predetermined schedule.

In order that a worker receive compensation for hernia due to occupation, he should prove that there was an injury of sufficient severity to cause hernia; that it appeared suddenly and immediately following the injury and was accompanied by pain; that it did not exist prior to the accident; that his employer was notified immediately; and that he had to cease work immediately and consult a physician within a reasonable time, say twenty-four hours. Hernia alleged to be due to occupation should be offered operation and compensation for not exceeding eight weeks. Refusal of operation, except in cases where the worker's physical condition precludes the giving of an anesthetic, should limit the employer's compensation liability to eight weeks only.

Compensation should be granted for such diseases as are due to causes peculiar to the regular occupation of the worker or which may arise out of the employment as the result of unexpected or unforeseen events connected therewith. Diseases of a contagious, communicable, or mental nature should be excluded from compensation. Sequelae of diseases of occupation should be compensated only when there is a direct causal relation between the disease, its sequelae, and the injury.

It is believed that the incorporation of the above or similar conditions would do much to clarify the difficulties under which workmen's compensation laws are now administered in the majority of states. Medical opinion should be given a much needed increased representation on the board so that the interests of both the employer and the employee may be better served. To accomplish this result a considerable amount of educational effort would need to be carried on among legislators, members of industrial accident commissions, the medical profession, and the community at large. The question should be discussed among members of medical societies, labor unions, and other organizations in order that all interested parties may become familiar with the shortcomings of the present laws and the benefits which constructive amendments would bring. Such bodies as the American Association of Industrial Physicians and Surgeons, the Conference Board of Physicians in Industry, and the New England Conference of Industrial Physicians should be interested. The International Association of Industrial Accident Boards and Commissions, which is the national association of official bodies administering workmen's compensation laws, should also be made acquainted with the proposals, and their active support should be enlisted. It is only by some such concerted action that these needed changes will be brought about.

THE SANITARY PROBLEMS OF THE SOUTH*

SAMUEL R. BENEDICT, M.D., F.A.C.S.
Chief Surgeon, Alabama Power Company, Birmingham, Alabama

WHEN your President requested that I write a paper on "The Sanitary Problems of the South," I do not believe that he realized the width and breadth of the subject. When you take into consideration the vast wilderness in which we of the South live, with only here and there a clearing, with the negro problem ever present, with swamps extending for miles and miles in all directions inhabited by wild beasts, with an occasional Indian still unconquered, with the deadly anopheline mosquito breeding everywhere by the millions, with malaria and smallpox in epidemic form and every summer typhoid epidemics occurring in every hamlet, with no efforts being made to handle sewerage or other sanitary problems such as water, etc., you can well realize the enormous problems before us.

I have outlined this picture of conditions one hundred years ago, so that I could give you a better picture of the progress that has been made in sanitation in the South. It may surprise you to know that there are some people who still think of the South as I have outlined it above. Only recently the Chamber of Commerce of Birmingham received a letter from a farmer in one of the far western states asking if there were any places in Alabama where the land was cleared sufficiently for a farm, and if there were any localities that were free of mosquitoes, seeming to imply just what I have mentioned above —a vast wilderness, swampy in many places, and infested with mosquitoes and other insects.

There is probably no part of the United States which has made as rapid progress in sanitation in the last few years as has the South. The boards of health of the different states are excellently organized and receive federal as well as state aid. The sanitary problems are in charge of such widely experienced men as Dr. S. W. Welch, State Health Officer of Alabama; Dr. Oscar Dowling, State Health Officer of Louisiana; and Dr. W. H. Rankin, State Health Officer of North Carolina, and are being so efficiently handled that in a few years the South will undoubtedly be far in advance of any other part of the country.

Something happened in Birmingham a few months ago which has been most gratifying to men who are working in sanitation in the South. Birmingham is a city of 200,000 inhabitants and is, I believe, one of the most modern cities in this country, blessed by the hand of God in every way, as to location, with coal, ores, and minerals in the greatest abundance, and with a climate unsurpassed; yet with it all, we have our sanitary problems. The sanitation of Birmingham, especially the milk supply, has been greatly improved in the past few years. The credit for this has been given, and rightly so, to Dr. J. D. Dowling, City Health Officer, who has a well-established organization and has fought the battles of sanitation without fear or favor since he entered office. A loving cup which is given yearly by a

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 9, 1924.

board of prominent men of Birmingham to the man who has been the greatest public benefactor during that year was recently awarded to him. I mention this to bring out the fact that the laymen of today are more and more realizing the importance of sanitation. One of the most astounding facts to me is that it is necessary for a commmunity to force on its citizens laws to protect them against disease. One would naturally expect that they would welcome the opportunity to clean up and have things sanitary.

Perhaps the greatest sanitary problems of the South today are malaria, hookworm, and typhoid fever, in the order named. Not that the whole South is burdened with these diseases, but that in a large percentage of the rural districts south of the Mason and Dixon line these diseases are prevalent. When I say prevalent, I mean that to these diseases can be attributed a large percentage of the sickness which exists in the rural and country districts and, to a large extent, the inefficiency of the people who are infected. From an industrial standpoint there is no disease which is so important as malaria. Its control would mean an annual saving of millions of dollars to the industries of the South.

In Alabama there exists every condition, as far as sanitary problems are concerned, that is found in any other state in the South. The general topography of the state is varied, as it includes mountainous regions extending up into Tennessee and northeast Georgia, foothills, prairie lands, and coast. There are large rivers which run through valleys and lowlands producing conditions that are analogous to those of other rivers of the South. Across the northern part of the state, running through the mountainous district, is one of the largest rivers in the South with its many problems of sanitation, and, indeed, other problems, for here we find Muscle Shoals, that great water power which, when developed to its full capacity, will equal Niagara. With the development of this water power will come the great problems of sanitation, and malaria control will be a tremendous task.

From the standpoint of the hydro-electric companies, malaria control is of the greatest importance, for under the Federal Water Power Act large bodies of water cannot be impounded unless every attention is given to malaria control. In order to comply with this Act it has been necessary for the Alabama Power Company, with which I am connected as chief surgeon and which is one of the largest southern hydro-electric power companies, to put into effect malaria control in an area of 80 square miles. The problem of preventing the development of malaria on the impounding of the water over this area was taken up by my office for solution and the work has only recently been completed. In studying this problem I visited Cuba, New Orleans, and many other southern points where malaria was most prevalent. In passing, I wish to say that those who have never been to Havana cannot realize the remarkable work in sanitation which has been accomplished in that city. I spent a week there and during that time I did not hear a single mosquito, in spite of the fact that in the hotel where I was staying there were no screens. To free Havana of mosquitoes would have been thought hardly possible a few years ago.

The conditions that confronted us were identically the same as those which confronted the Company ten years ago when it built the great dam across the

Coosa River known as Lock 12, which is 13 miles north of the new dam. At that time precautions were not taken to prevent the development of malaria following the impounding of the water. In fact, the Federal Water Power Act was not in existence and no clearing of any moment was done. The result was that the Company was placed in a very embarrassing position by having approximately $1,000,000 worth of suits brought by people living in the vicinity of this impounded water, who claimed that they contracted malaria as a result of this development. In order to prevent a repetition of occurrences of this kind and to protect the health of the people who were living in the vicinity of our recently impounded water, a rigid malaria control was put into effect in the area involved.

Into this area of 80 square miles, which was heavily wooded and exceedingly hilly, with many branches and creeks entering the river, with lowlands in abundance, inhabited here and there by farmers, it was necessary to put a malaria control to govern and prevent the breeding of anopheline mosquitoes on the impounding of the water. Under the Federal Water Power Act it is necessary that every tree which would extend above the surface of the impounded water be felled and that on the impounding of the water the banks be cleared for 20 feet above the low water mark. This meant that around this lake 153 miles of bank had to be cleared in order to permit wave action and prevent the breeding of anopheline wigglers. In order to clear this large area, which was heavily wooded with virgin pine, oak, and many hard woods, it was necessary for a large crew of men to enter it. To prevent these men from developing malaria and from transmitting it, certain rules and regulations were necessary. Great care was exercised to prevent any men who had malaria from entering this area. During the whole clearing of the basin, therefore, no man entered to work for the Company who had not had a thorough physical examination and who did not have a blood smear made for malaria.

Even though the blood smear were negative, if the applicant had had a chill within six weeks of the time when he applied for the position, he was rejected. So that none of the men sent into the basin would develop malaria, the clearing camps were placed in the best possible localities and a mosquito control was put in within a mile radius of them. In addition, screens and mosquito nets were used wherever it was necessary. The measure upon which we relied most, however, was the administration of quinine to every employee working in the basin. This was not carried out in a haphazard manner, but on two consecutive nights of each week the employees of each camp passed before the timekeeper, who administered 15 grains of quinine on each night, saw that it was taken, and noted this fact on his time sheet. These time sheets were sent in to the Sanitary Department monthly and were carefully checked. If a man refused to take the quinine or to obey instructions relative to the prevention of malaria which were issued by the Sanitary Department, his services were immediately dispensed with. So rigidly was this rule enforced and so thoroughly did the administration of the quinine immmunize these employees that not a single case of malaria developed among the men while they were at work clearing the basin.

As far as the inhabitants of this basin were concerned, every precaution was taken to protect their health. Ev-

ery inhabitant, from children 1 year old up to the eldest, had a history taken which emphasized all contagious diseases, and especially malaria. In addition, every member of the families had blood smears made which were examined in the laboratory at our nearest Company hospital. In fact, one technician handled the laboratory malarial work of the basin and did practically nothing else. When we found an inhabitant who developed chills and fever, we immediately isolated him and placed a mosquito net over the bed. When it was possible for us to do so, we persuaded him to go to the Company hospital. He was then given 30 grains of quinine on three consecutive days. The blood was again examined and, if the results were negative, the patient signed a statement whereby he agreed to take 10 grains of quinine every night for sixty nights and was dismissed.

During the period of constructing this big dam and of clearing the basin only one serious outbreak of malaria occurred; this was in an isolated family which had failed to comply with the rules and regulations of the Sanitary Department. A malignant type of malaria developed and, before sufficient quinine could be given this family to control the disease, two members, a small baby and a young girl, died. Had not the others been taken to the Company hospital immediately they would probably all have succumbed. There were no further developments from this outbreak and no other serious outbreak of this character took place during the clearing of the basin.

As an additional preventive measure, a malaria control was put in around the houses of the inhabitants of the basin. From every branch and stream within a radius of 1 mile of the homes of the inhabitants, specimens of anopheline wigglers were obtained. These were captured in standard bottles, labeled, numbered, etc., and were taken immediately to the Company laboratory where the anopheline mosquitoes were hatched, chloroformed, and mounted by the technician in charge. Hundreds of wigglers were collected and hundreds of mosquitoes mounted. Around the houses of the employees oil was used extensively to prevent the breeding of mosquitoes, and, where it was possible to do so, stagnant water was removed by ditching. To have carried out a mosquito control over this whole area of 80 square miles would have cost an enormous sum of money and at the same time would have produced doubtful results. Therefore, we protected as far as possible only the local camps and the people living in the basin.

Since the impounding of the water, there has not been an outbreak of malaria in any sense of the word. In fact, the cases of malaria within a 1 mile radius of the impounded water have been less since the water was impounded than in previous years. No suits of any kind have been entered against the Company and will not be, as there are no grounds whatsoever on which to bring suit since conditions are better than they were before the water was backed up.

At the time of the clearing of the basin we also had constructed ninety ponds ranging in size from 20 feet by 20 feet up to one covering one-half an acre. These ponds were distributed over the basin and were made along the course of small branches and streams, and into them were poured thousands of gambusia affinis, or top minnows. This little fish measures about 1 to 1½ inches and is viviparous, that is, gives birth to its young and does not lay eggs. Usually a female gambusia will give

birth to as many as six broods a year, each brood ranging from two or three to fifty or sixty fish. This fish is one of the hardiest known and you can easily see how rapidly they would multiply during the period of one year. These minnow ponds were well stocked with algae and in this way the fish were kept in excellent condition. It was necessary, however, that they be fed two or three days each week and to accomplish this men on horses were designated a certain number of ponds to take care of. These ponds being on different levels, as the water rose the fish were freed and the consequence was that there was not a place along the banks of this impounded water in which they could not be found in abundance. To what extent this fish production assisted in the control of malaria in this water power development cannot be said at the present time.

I have outlined this special instance of malaria control because it typifies to a certain extent others that are being put in over the South today by private corporations, by the state boards of health, by county boards of health, and by city boards of health. The consequence is that Alabama, and the South as a whole, is rapidly being rid of malaria, but even with the rapid progress that is being made at the present time difficult problems in sanitation still confront the men who are interested in this subject.

Second among the sanitary problems of the South from an economic standpoint is hookworm. This disease, which was discovered in the South only a few years ago, has been responsible for an enormous amount of inefficiency. The hookworm problem is one that could be gone into at length with a great deal of interest. It is sufficient, however, to say that the state boards of health and the sanitary departments of corporations over the South are taking careful cognizance of this condition and hookworm is rapidly disappearing in the southern states. In 1906 I was fortunate enough to be a member of a commission which did the first work on hookworm in the South and since that time I have been intensely interested in the elimination of this very unnecessary disease.

In contrast to hookworm we have the third disease of the group that I have mentioned—typhoid fever. Here we have a question, not of inefficiency, but of great economic loss, and frequently death, as a result of severe illness. At the present time, with the installation of water supplies which are properly filtrated and chlorinated, with the elimination of the surface well, and with careful milk control, typhoid fever is rapidly being eliminated. In fact, it is no longer a problem in the cities and towns. In the outlying districts and in the country, however, it still exists to quite an extent. In the country districts the state boards of health have taken steps to isolate carriers and put them under control. This measure, together with the circulation of educational literature, is accomplishing good results, and it is hoped that in a few years conditions in the country will compare favorably with those in the cities and towns.

The sanitation which interests the members of this Association most and which is of greatest interest to me personally is, of course, industrial sanitation. The Alabama Power Company is, I believe, more advanced in the question of sanitation than any other hydro-electric power company of the South. Even in our construction camps during the building of the large dams across the rivers of Alabama, we install a per-

manent water supply with complete filtration, chlorination, etc., to protect the health of the men on the construction jobs. We also put in sewers, screen the houses throughout with 16-mesh wire, and install an active malaria control. Fly control, food inspections, proper garbage disposal, etc., are carried out in detail by the local sanitation department.

Few people in the North realize that, except for the three diseases which I have mentioned, the South is perhaps more healthful than any other part of the United States. In a few years we expect to have these diseases under absolute control and then we shall be able to say, "Come South and settle in the most healthful part of the United States."

REHABILITATION OF THE PHYSICALLY HANDICAPPED*

R. M. Little
Director of Rehabilitation, State of New York

A national program for the rehabilitation of the physically handicapped has been started by the federal government and thirty-six states. The first appropriation by the federal government to the states for the purpose of undertaking this difficult task was for a period of four years which closed June 30. The last Congress has extended the law for another period in order that the program may be well established and become a permanent part of state service. Perhaps federal assistance may not be renewed after this second appropriation expires.

The reason that the federal and state governments have established this service in behalf of the physically handicapped is because there are so many of them. Each year there are approximately 3,000,000 lost-time accidents in industry. There is a large and increasing number of public accidents caused by automobiles, trucks, railroads, and traction lines. Many persons are injured on farms, in homes, and in recreation. A large number are handicapped as a result of disease. A relatively small number suffer from physical defects which are of a congenital nature. Among all these there are a great many permanent partial disability cases in which there is a potential working power which can be evoked and put to use through wise and practical methods. The rehabilitation service is primarily intended for such persons. Children under 14 years of age and old people under custodial care are not eligible nor are the unhelpable and hopeless classes.

A Year's Work

During the year closing June 30, 1923, 4,530 handicapped persons were rehabilitated and on July 1 there were 11,267 active cases under the care of the thirty-six state bureaus. Less than 50 per cent. of the federal appropriations were called for by the states, and the total expenditures from federal and state funds for the last year amounted to $1,159,811.63, or a per capita cost of $253.84. In New York State 612 persons were rehabilitated. This number included 530 men and 82 women of an average age of 32.1 years. Their initial weekly wage when they returned to employment was $20.05. The per capita cost in New York was $163.01. Obviously, the per capita cost in the large industrial states will be lower than in the sparsely settled states.

It is a significant economic and social fact that physically handicapped persons can be returned to gainful occupations at a per capita cost of a little more than $250, which includes all administrative expenses, tuition, supplies, traveling expenses, artificial appliances, and everything that is done for them. The exact cost of maintaining a dependent person in a public institution for the whole country is not known, but in many states it is $300 per capita; in private homes or institutions it is, of course, greater. Something of the economic and social gain may be indicated

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 9, 1924.

from the fact that last year 4,530 persons started earning $4,530,000 in wages instead of having $1,359,000 expended for their maintenance. These facts are presented because the primary object of the Rehabilitation Act is economic and social gain. The service must justify itself by such returns to the country. These figures do not reveal what this new service means to the physically handicapped themselves in opening for them new opportunities in life, inspiring them with fresh hope, and enabling them to preserve their self-respect instead of being buffeted about and becoming disheartened and embittered by the adverse circumstances of life. The physically handicapped of thirty-six states who are susceptible of being returned to gainful occupations now have this opportunity, and thousands are availing themselves of it.

Administrative Agencies

A bureau in the Federal Board for Vocational Education co-operates with similar bureaus which have been established in the State Departments of Education in carrying on the work. The duties of the federal bureau are fiscal and advisory. It is a clearing house of information, publishes builetins, gathers statistics, calls conferences, and advises with the state bureaus in developing the work. Although the state bureaus are in the Departments of Education, they co-operate with the State Departments of Labor and Health by receiving reports of injured people from these departments and also by advising with compensation officials about compensation problems and with orthopedic surgeons and nurses of the Health Departments concerning crippled people over 14 years of age who may be under the care of the State Departments of Health. An effort is being made to utilize as far as possible in the development of the rehabilitation program the governmental agencies already existing.

Fortunately, the civilian rehabilitation effort was started without being enveloped in a hectic sentiment and plagued by political interference. The work has been inaugurated in most states without a blast of trumpets and upon a conservative and thoughtful basis, akin to the spirit of intelligence which prevails in the State Departments of Education. The workers have usually been selected by the civil service process, and for the most part only men and women who are genuinely interested in the effort have been appointed. Most of those engaged in the work had little experience with physically handicapped persons before the state bureaus were established, and the first three years have been an experimental period. There was a general knowledge of the problem available from social workers and industrial and compensation officials. It early became manifest that the experience of the federal government in attempting to rehabilitate disabled soldiers, sailors, and marines furnished little help for the civilian rehabilitation effort unless it was a warning of how not to do it. We have had to learn how to rehabilitate physically handicapped people by doing it. All the theoretical knowledge and general suppositions had to be tested out by definite, concrete case work. In a large number of states the experimental period is drawing to a close. The workers are becoming efficient in helping to solve the many baffling human problems which come to their attention. It is apparent that there are large possibilities in the field of vocational education of the physically handi-

capped. Economic and social wastes can be greatly reduced. A large number of citizens who are permanently partially disabled can be restored to economic usefulness instead of being cast upon a human scrap heap by the maiming hazards of modern life.

What Is Rehabilitation?

The law defines rehabilitation as the rendering of a physically handicapped person fit to engage in a remunerative occupation. The aim is to adapt handicapped persons by physical reconstruction, advice, training, and guidance to occupations in which they may be employed upon the same conditions as are normal workers. From the industrial point of view, rehabilitation is the third phase of a conservation program for workers. The first phase of the program is safety, health, and sanitation in the places of employment. The second phase is compensation and medical and surgical service for the injured during the period of disability. The third phase is rehabilitation for those who are injured and cannot return to any occupation without some special training or assistance. The first step in rehabilitation is rendering an injured person physically and mentally fit for retraining. From the medical point of view, rehabilitation is all-round convalescence, including the physical, economic, and social welfare, and should start at the time of an injury and proceed synthetically through the hospital and convalescent period, embracing medical and surgical treatment, perhaps prevocational therapy, sometimes occupational therapy, and retraining by a special course of instruction for a job, and then induction into a job.

The physically disabled are not handled in groups nor can the usual standards of school work be employed in their behalf. They do not fit well into standards for normal pupils. Experience shows that the rehabilitation of the disabled is a highly complex, specialized, personal service which must take form according to the peculiar difficulties and aptitude of each person. For one, it may be assistance to secure physical reconstruction and a prosthetic appliance that he may return to his former occupation or engage in a new one. For another, it may be changing from unfavorable working conditions to a more helpful environment. For another, it may be giving counsel and advice about entering upon a business venture. Many industrial workers must be retrained in industry, others may take correspondence courses in their homes and be guided by tutors. Many, particularly the young, are sent to trade and technical schools for special courses, and a small proportion are retrained in commercial schools.

Every physically handicapped person presents a number of distinct problems which the rehabilitation workers must deal with sympathetically and with imagination, patience, and ingenuity. Case-work methods, therefore, are fundamental to success in rehabilitation.

Attitude of Employers

Employers are, for the most part, sympathetic toward the physically handicapped, but at the same time they dislike to employ any considerable number of them. They wish standard workers, which usually means workers without physical defects, and they can be induced to accept those who have suffered physical disabilities only by being assured that they are competent to render satisfactory service.

Many large companies are accepting

gladly the rehabilitation service in behalf of their own employees and are co-operating in a generous fashion to assist in it. The majority of physically handicapped persons, however, meet with their misfortunes in small industries, and it becomes necessary for the bureaus to be versatile and have a wide knowledge of small industries where many opportunities can be found for the physically handicapped. This does not mean the traditional jobs as watchman, gate keeper, and street pedler, but real occupations in small establishments and specialized industries. There must be a wide distribution in industry of the trainees of the rehabilitation service. They can no more be absorbed by industry in groups than they can be trained in groups. Restored to normal skill and made efficient, a suitable place must be found for the physically handicapped in order that positions may be reasonably secure and employers satisfied.

Medical and Surgical Service

The medical and surgical service which physically handicapped people receive is of fundamental importance in their rehabilitation. The first step is to render injured workers mentally and physically susceptible of rehabilitation. Unless physicians and surgeons have done their work in an efficient and practical manner, the rehabilitation of injured workers is almost impossible. Great emphasis needs, therefore, to be placed upon the necessity for a high standard of medical and surgical service. It is a pleasure to mention the fine work which many physicians and surgeons are rendering and to note the growing interest in industrial workers on the part of high-grade men. This is particularly true of most of the industrial surgeons and physicians who are in charge of the medical work in large industrial plants. The most hopeful tendency for a better medical service for industrial workers is observed in the better organized industries where the value of expert medical and surgical service is recognized. Unfortunately, the majority of industries do not have such a service and workers when injured are dependent upon general practitioners who are of varied skill and experience. Usually the medical man in general practice does not have an industrial and social point of view and although he may be conscientious and moderately skilful, he does not think in the corollaries of his work. Apparently many physicians proceed with their treatment without giving any thought to the occupations and economic responsibilities of those whom they serve. Often the result may be a success from a strictly surgical point of view, but a hindrance from an occupational point of view. The number of stiff joints, pendant fingers, and useless members which the rehabilitation workers find among the physically handicapped as a result of thoughtless surgery is distressing.

Broad contact with the physically handicapped of the country reveals the alarming fact that there is a great amount of ignorant, incompetent, and thoughtless service being rendered injured workers by the medical profession. This is the testimony from every state engaged in the rehabilitation effort. Much of the work of rehabilitation bureaus consists in having reviewed and corrected bad surgical practice upon the part of incompetent physicians. Indeed, many rehabilitation workers have come to think that poor physicians and surgeons are a greater danger to injured workers than the

hazards of their places of employment. All intelligent, observing men of the profession recognize that this has been, and is, true, but formerly the general public was not aware of the fact. Now the physically handicapped are being sought out and studied by the governmental service and there gradually is accumulating a large amount of data which reveals the poignant need of a higher standard of medical and surgical service on behalf of injured workers. No longer will incompetent and criminal practices escape notice.

Perhaps this will be one of the large gains to the country from the rehabilitation effort, as it will lend support to the high-minded, competent men in the profession who are insisting upon better medical training, hospital experience and orthopedic skill as a prerequisite for professional standing. Whatever brings to light and makes conspicuous the blunders and incompetency of medical men is a genuine contribution to higher standards. In a sense, physicians and surgeons are in competition with each other, but the ethics of the profession have prevented competent men from specifically criticizing incompetent men. The layman is often amused and irritated by the unwillingness of one physician to say that another physician has bungled an operation. That which seems obvious to the layman is excused and palliated by the professional man. Quite true, the layman is not competent to judge accurately whether or not an operation has been properly performed, but he is able to judge whether or not the economic and social results of operations are valuable. If you had your automobile overhauled at a garage and then found that the engine would not run, you would have a rather clear and definite opinion as to the competency of the automobile mechanic who had worked upon it. When rehabilitation workers find thousands of crippled persons who cannot carry on in gainful pursuits because of stiff joints, shortened limbs, and pendant members, they form the conclusion, justly or unjustly, that there is a large amount of incompetent surgery being performed. We are strengthened in this conviction by the remarkable cures and effective operations which are being performed. Those who have been for many years engaged in workmen's compensation, rehabilitation, and social work are firmly convinced that, if injured workers could receive at the time of their injury the attention of the more competent and successful physicians and surgeons, many more of the physically handicapped could be successfully rehabilitated.

All of this means higher standards for medical education, longer and more thorough training as hospital internes, and ultimately higher legal requirements for permission to practise medicine and surgery. An awakening public opinion will insist upon this as an enlightened opinion and competition make necessary an improvement in all other professions and lines of business activity. For example, the National Cash Register Company has recently placed on the market a new register numbered 2,000, which contains 16,000 parts. The company maintains a training and repair school in Dayton where an average of 200 young men undergo a fourteen months' course of intensive training before they are sent into the field to serve agencies. These young men are carefully selected from different parts of the country. They must have had at least a high school education, must be 21 years of age, and must have good character, intelligence, mechanical apti-

tude and interest. They are paid 45 cents an hour while in the repair school. They are given close personal supervision and instruction and before they can graduate must have mastered register No. 2,000 with its 16,000 parts. They must know every part in relation to every other part and must be able to take the register apart and assemble it again accurately. A further test is that of observing stereoscopic slides of all these 16,000 parts and giving the name of each part and its function. The course of instruction is so thorough and exacting that about 60 per cent. of all the young men who enter the school fail to pass the examination and only those who have mastered the register and who can go into the field and repair and adjust machines are given the opportunity. Similar training schools have been established in other large industries.

If industries are rendering this sort of service in order that their mechanical products may be acceptable, how much more necessary is it that young men who enter the medical schools shall have a good education, character, and intelligence as prerequisites, and then within the medical schools and hospitals receive a thorough and intensive training which will enable them as physicians and surgeons to deal competently and efficiently with the most marvelous organism that we know of—the human body? A cash register with 16,000 parts is a marvelous piece of mechanism, but it does not compare with the human body and its living parts, all of which are injured when the body is diseased or maimed. The human hand, foot, or eye is each more wonderful in itself than a cash register and requires a higher grade of intelligence, a finer technic, and a broader understanding for proper treatment than does any piece of machinery that man ever made.

Society is awakening to the fact that men are more valuable than machines and that they must receive a more intelligent and skilful service when injured than do machines. The federal government and the thirty-six states are placing an emphasis on this fact by the new rehabilitation service. Well-trained, conscientious and skilful physicians and surgeons will gain a benefit therefrom. The poorly equipped members of the profession will gradually be found out and brought under the condemnation of an enlightened public opinion. There is a better day coming for character, skill, and competency in the medical profession as well as in others. Many are the exponents and pioneers of this standard within the profession. May the numbers rapidly increase and may the day come, in the not far distant future, when the medical profession in our country may be in the vanguard of human progress. The recent large endowments given to four or five great medical centers indicate that there is a wide recognition of needed improvement, and potent and practical arrangements are being made to bring it about.

THE INDUSTRIAL PHYSICIAN AND PREVENTIVE MEDICINE*

JOHN DODSON, M.D.
Editor of "Hygeia," Chicago

THE marvelous advance of the medical sciences in the last sixty years has yielded practical results almost wholly in the field of prevention rather than in the field of cure. The medical profession can render far the largest service to humanity in the preventive field.

Personal hygiene is more important than community hygiene in the maintenance of positive, effective health. Personal hygiene is almost entirely a matter of education and of habits born of training. In this education the physician is the primary and most essential factor.

If humanity is to realize the great possibilities of the large and constantly increasing body of medical knowledge, the general practitioner must become the family health adviser, as well as and even more than he is the family doctor. He must be compensated for the service so rendered, just as he is paid for prescribing drugs or doing surgical operating, in an amount justly proportionate to the long, arduous period of preparation required for medical work.

These statements are trite truisms to an audience of industrial physicians and need no supporting arguments. They are set down here simply as a basis for the queries—What are we going to do about it? How are we to bring about this change of relation—this enlargement of service and responsibility of the family doctor to his clientele?

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 9, 1924.

Notwithstanding the fact that these opening statements are self-evident to anyone familiar with modern medicine, this rearrangement is going to be no easy or speedily accomplished task. Since time began, man has sought the doctor of medicine to find relief from pain and distress—one of the most fundamental and compelling instincts of human kind. Moreover, until very recent times the physician has had relatively little to offer in the way of sound, sure advice as to how sickness and suffering could be prevented. All the knowledge which had been accumulated in previous centuries as to the structure of the human body (anatomy), its functions (physiology), the end results of disease (pathologic anatomy), and the signs and symptoms of the various diseases availed little toward prevention. Knowledge of how to prevent disease could come only with a definite knowledge of the causes of disease and of the modes of transmission from one person to another. That knowledge dates from the work of Pasteur only sixty years ago.

The conclusive demonstration of the germ origin of many diseases, with the rapid development of biologic chemistry, of physiology, and of the other sciences fundamental to medicine, has revolutionized the whole situation, not only in relation to the communicable diseases, but also in relation to other groups, conspicuously the disorders of nutrition and diet, disturbances of the endocrine glands, diseases arising from focal infections, and disturbances of the nervous system.

For the past twenty years certain

groups of the medical and allied professions have been awakening to the great possibilities of preventive measures. The pioneers were the dentists. For many years a few of the wiser practitioners of dentistry have instructed their patrons to come to them at regular intervals for an examination of their teeth, that they might be advised as to their proper care and might have slight defects repaired in their incipiency. More recently this custom has become almost universal in dental practice.

Next in order of time were the physicians who devote themselves to the care of children. After attempting to arrest the appalling infant mortality first by the sterilization and pasteurization of milk, and then by the establishment of milk stations for the distribution of clean and modified milk, together with the provision of summer tent colonies, sanatoria and floating hospitals, the pediatric world, under the leadership of Budin of Paris, discovered that the crux of the infant welfare question was the education of the mother in the proper care of her well baby. Today a large part of the time and thought of the physician for children in private as well as in dispensary practice is devoted to the care of the normal child, with the gratifying result that infant mortality, in commmunities where infant welfare practice is thoroughly conducted, has been much more than cut in half. An important adjunct in infant welfare work has been the growing attention of the obstetric practitioner to the prenatal care of the mother.

Next in order may be placed the group of industrial physicians. Employed at first as surgeons, mainly for the purpose of securing prompt, skilful attention to accidents, the doctors in industrial establishments have found a much larger field of usefulness in the prevention of disease among the employees and their families.

Mention should be made, also, of some of the life insurance companies, and of certain associated organizations, which have done a good deal to educate their policyholders by making provision for their periodic physical examination.

In spite of the demonstration of the beneficent results of these several phases of preventive medical work, the profession as a whole is slow to realize its importance. Fortunately, some of the leaders in thought are fully alive to the situation and the House of Delegates of the American Medical Association at its meeting in St. Louis, in 1922, definitely committed the Association to the project of Periodic Examinations of the Apparently Healthy, the initial and a very essential step, although by no means the only one, in any preventive medicine program. A report of a definite plan for the conduct of such an examination with form for a suitable blank was presented to the house at its meeting a year ago by a committee of the former Council (now a Bureau) on Health and Public Instruction and was adopted.

Some progress has been made during the past year in arousing an interest in the matter. In some localities—*e.g.*, in Maine, Illinois, and Ohio—the business of educating the public as to the value of such examinations has been put in the hands of lay or semi-lay organizations. In Brooklyn, N. Y., the Tuberculosis Association and the Kings County Medical Society have waged a vigorous campaign both for the information of the public and for the education of the physician. At the headquarters of the American Medical Association it is felt that the function of educating the public should be left almost wholly to lay or semi-lay organizations

co-operating with, and advised by, the representatives of the medical societies. The major task of the medical profession is to arouse its own members to the importance of these examinations and to the imperative necessity that they be made in such a thorough, careful manner as to command the confidence of the examinee and convince him that he is getting value received. To promote the accomplishment of this result letters were addressed to each of the leading medical schools, pointing out the need for instruction of their students in this matter. A similar communication was addressed to the medical staffs of 100 selected hospitals urging that they arrange short courses of instruction along this line for the general practitioners in the vicinity of their institutions. The response to these communications was not very satisfactory, especially from the hospitals. It is quite evident that members of the medical profession generally are not alive to the importance of this movement. Their apathetic attitude is indicated by many of the 5,000 medical and hygiene questions gathered by Dr. Lydia A. De Vilbiss from those submitted by lay audiences in a forum following health lectures given at Chatauquas and Lyceums in every part of the United States during the last six years. They indicate a critical attitude on the part of the laymen who submitted the questions. Some of them were as follows:

"How can we create a condition that will put the physicians in an attitude of willingness to give people preventive examination and treatment?"

"Why does not the average physician give advice as to general health principles?" "I have consulted my doctor and I find he does not take any interest but turns away without satisfaction."

"How is one going to go about it to get a thorough examination from the average doctor or will one have to consult a specialist?"

These are questions (from the laity) which should set the professional man thinking.

I am strongly inclined to think that the non-medical public is being more rapidly educated in this matter and is more awake to the possibilities of preventive medicine and the value of periodic health examinations than is the average doctor. It is quite probable that the medical profession will be aroused most effectively to its responsibilities by the demand of an enlightened public determined to enjoy to the full the benefits of modern medical science. And here is where the great group of industrial physicians can render a large service. In contact, as they are, with large bodies of intelligent workers they are in a position and it is in the line of their duty not only to make use of all the available agencies of preventive medicine to promote the health of those under their care, but to apply these methods in such a way as to educate these employees as to their value. The most fundamental of these measures is the thorough physical (including mental) examination of the employee when he enters the service of the company and subsequent examination, either at stated intervals—*e.g.*, once a year—or, in the case of each employee, at any time when he himself or one under whose immediate supervision he works believes there is reason to suspect some impairment of health.

Reports from industrial physicians indicate that the objections of industrial workers to such examinations have been pretty generally allayed. It is coming to be understood that their purpose is not the rejection or discharge of the employee, but his assignment to

work which is compatible with his physical and mental condition.

Certain features of periodic examination of the healthy warrant careful consideration. The layman naturally inquires as to what is their purpose, and against what ailments they afford protection. They do not protect one against the invasion of the infectious diseases, with one or two possible exceptions. The immunity against each of these diseases is specific and, if not naturally enjoyed by the individual, is to be acquired only by specific measures. In the case of tuberculosis, it seems certain that in many instances a robust physical condition, such as can be promoted in many individuals by hygienic living, does afford a measure of protection against re-infection from oneself or others. In practically all other diseases of the group, immunity can be conferred only by an attack of the disease or by artificial means, such as vaccination against smallpox, anti-typhoid inoculation, toxin-anti-toxin for diphtheria, a similar inoculation for scarlet fever, and anti-tetanic serum for lockjaw. In the absence of such immunity these diseases attack the strong as well as the weak in about the same ratio. One of the recent curious and unpardonable vagaries of the profession has been shotgun inoculation with so-called polyvalent cultures. Happily, physicians seem to be recovering from this obsession.

Much has been and is being added to our knowledge of the evil results of errors of diet, especially of over-eating, and of the relation of obesity to diabetes. These are among the hygienic errors which can be detected by the periodic examination and can be warned against by the physician.

Something has been added to our knowledge of the endocrine glands, especially of the thyroid, and some of the disorders resulting from their secretory defects have been brought within the realm of preventive, as well as of curative, medicine. It is hardly necessary to remark that this field is being enormously overworked and the numerous unwarranted claims made for endocrine therapy are a serious reproach to the medical profession.

The relation of focal infection to affections of the joints and of the cardio-vascular-renal apparatus and to other types of disease is well established, although much remains to be done in this field. It is especially in the young that the detection and correction of remediable defects result in frequent prevention of disturbances of the general system. The early detection and removal of deep-seated cancer are to be regarded as a preventive measure, because they hold out the only hope of life saving.

It is impossible and unnecessary for the purposes of this discussion to enumerate all of the diseases against which the periodic examination affords some measure of protection and those which it cannot forestall. The important thing is that the examiner, when asked why the periodic examination is advised, shall make as clear as possible to his client what may be and what may not be expected of it.

Who shall make periodic examinations? Is this type of medical work such that it can be properly done only by one who restricts his work to this field? Are we to have a new specialty —"Examining the apparently healthy," or shall the examinations be made by a group in which are several of the recognized specialists, or is it the function of the family doctor and health adviser to make them?

There seems no justification whatever for making a specialty of physical ex-

amination of the healthy. The methods employed are the same as those used in the examination of the sick, although often the examination of the well person will require more time and effort to warrant a positive conclusion. Group examination is of necessity more expensive, is inaccessible for a large proportion of the public, and is unnecessary in the majority of cases. The general practitioner—where possible the one who is serving as the family doctor—is the one who, as a rule, must make these examinations if they are to become a general custom.

In the long run better results will be secured if the industrial establishment requires of each applicant, not a mere certificate of health, but a detailed report of a physical examination made by his family doctor, this report to be satisfactory to the medical department of the industrial establishment. It would be a great convenience and advantage if some uniform blank—like that of the American Medical Association when finally amended so as to be generally satisfactory—could be used by all industrial establishments and physicians. For those employees who cannot afford the expense of such an examination, provision should be made for examination at some dispensary or by the physician of the company, either for a fee which can be paid without hardship or for no fee at all.

Such an examination for an industrial employee, just as for any other person, will lack a large part of its value unless it is followed up by a careful explanation to the person examined of any physical defects which have been found and of their significance, and also by sound advice as to his habits of eating, of working and, in general, of living. If such advice has not been given by the physician who makes the examination and report, it should be supplied by the industrial physician. Such a procedure has wide-reaching educational value not only for the individual but for his family, his associates, and the community. It can be made a potent means of securing support for and co-operation with the public health department.

First-aid and life saving classes should be universally taught in industrial establishments until every employee has been made familiar with the approved methods of meeting emergencies and life saving. This is of importance not only for its own sake in minimizing the results of accidents to the employees but for its educational value. Likewise, home nursing should be taught to female employees for its own sake and for its educational results. It is of especial value to the families of persons engaged in the industries who are so seldom able to afford the expense of professional nurses.

It is reported from some establishments that the employees do not take kindly to first-aid instruction. It is difficult to account for this attitude when similar instruction is received with such enthusiastic interest by the workers in Great Britain. Prize contests between first-aid classes representing different industrial groups are there conducted before large audiences of fellow workers and their families and are followed with as much vociferous enthusiasm as a cricket or football match. There must have been, with us, some fault in the method of approach. There is no reason to suppose that the mental attitude of the American worker in this matter is essentially different from that of the British worker.

Within the last decade a remarkable—one may say a revolutionary—change has been taking place in the attitude of

public school officials and teachers, and therefore also of pupils, toward the subject of health and all that it involves. Health is being made the first and most fundamental tenet of the whole school program. An evidence of this was seen in a Health Poster Exhibition which is now on display at the building of the American Medical Association, Chicago. In the March issue of *Hygeia,* a journal of health for the laity published by the American Medical Association, announcement was made of a prize contest for posters on any subject relating to health, open to high school pupils. There were submitted 4,492 posters, representing schools from every state in the union and from Canada. About 1,000 of these have been put on display for consideration by the jury of award. The originality displayed by many of the contestants in the phrasing of the health slogans, the ingenuity of the devices for putting these ideas across, and the artistic ability, shown in the fine drawing and exquisite coloring, are ample evidence that health is being given an important place in the school curriculum.

If the medical profession will be as diligent in the health instruction of adults as is the teaching profession in the training and education of our children for health, the next decade or two will witness a great advance in the health betterment of our people. The industrial physicians constitute a group who are in a peculiarly strategic position to render service in the health education of the community.

SILICOSIS: A MODERN FACTORY HEALTH HAZARD*

JAMES A. BRITTON, M.D.
International Harvester Company, Chicago, Illinois

A great many investigations have been made and much has been written about the health hazard due to an accumulation of dust in the lungs. While the first observations on this condition were made nearly two hundred years ago, most of the intensive investigation has been done within the last two decades. Some of the more recent comprehensive writing on the subject has been done by such men as Oliver, Haldane, Collis, Middleton, and Landis.

All authorities agree that there is a wide variation in the degree of danger from dust depending upon the physical and chemical characteristics of the different kinds of dust. Generally speaking, the dust which does permanent harm to lung tissue is the dust which, for some reason or other, is not eliminated from the lungs. The dust which produces an immediate, rather violent reaction is usually eliminated; that which does not produce very much immediate reaction is retained. The injurious effect of dusts in general, aside from a few unusual dusts which are harmful on account of their toxic properties, depends upon (1) the smallness of the dust particles, (2) the angularity of the particles, (3) the degree of insolubility, and (4) the difficulty with which the substances form chemical compounds.

While there are a number of dusts which do more or less harm, silica is the only one which has been found to be a serious occupational hazard. Silica is intensely hard, and when it is broken up it separates into minute particles, all of which are angular in shape. Silica is almost entirely insoluble, even in a laboratory. It is entirely insoluble in any of the body fluids. It does not readily form chemical combinations with other substances, either organic or inorganic. Because of the smallness of the particles it is possible for them to enter into the smallest air spaces in the lungs, but practically no immediate irritation is produced in the lung tissue, owing to their insolubility and the difficulty of uniting with other substances. The epithelial cells lining the alveoli of the lungs are penetrated by these small particles and because of the lack of irritation produced by this penetration they do not throw off the particles, nor is there the usual desquamation which ordinarily follows irritation of an epithelial cell. As a result, the dust particles become permanently imbedded in the cellular structure, causing a slow but gradual and persistent transition of the normal cellular structures into fibrous tissue.

The principal occupations in this country where the condition of silicosis in workmen is commonly found include certain types of mining where silica in its various forms (quartz, flint, sandstone) is encountered, quarrying of certain kinds of stone, particularly sandstone and granite, and work in industrial establishments where sand blast-

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 10, 1924.

ing or knife grinding on native sandstone is done. In all of these occupations the hazard is due entirely to the same cause—the silica dust which is produced. In gold mining, particularly after drilling or blasting, the mine is filled with fine dust which does not settle for a long time. The same condition prevails in quarries. In a great many factories, particularly automobile factories, sand blasting is a common practice. In the old type of sand blast where the operator is enclosed in a room or cubicle and directs the stream of sand by hand, there is great danger from the constant dense dust produced. In factories where edge tools are made, including those used on machines, the hazard depends upon the composition of the grinding stone or wheel and not upon whether the grinding is done wet or dry. Unfortunately I do not know the composition of the emery wheels used on certain types of jobs. I have a case at present of a man who has operated a universal tool grinder of the emery stone type for two years (the emery wheel was about 8 inches in diameter and 2 inches thick) who has a typical grinder's chest.

The belief has been rather common in this country that the hazard from grindstones was eliminated if water was used. As a matter of fact, the spray which comes from a wet grindstone carries the dust with it and not only does the dust seem to be as readily inhaled when moist as when dry, but the moisture in the sandstone grinding seems to be an additional hazard to the operator. It is interesting to note, in looking over the various state laws on protection against grinding, that some of our most progressive states as far as protection of workers is concerned, such as Wisconsin and New York, explain in elaborate detail what must be done to protect grinding wheels, and then in the last phrase add, "except this does not apply if water is used."

In spite of the volume of literature on this subject and in spite of the eminence of the authorities, the average industrial physician thinks of silicosis as something applying to mines, quarries, and knife factories. Few industrial physicians are familiar with the fact that in almost every modern factory where iron and steel are the principal raw materials there are some operations which are very hazardous because of the silica dust produced. The disability and death rates from silicosis in certain mines, quarries, and knife shops are conspicuous because those exposed to this health hazard make up a large percentage of the total number of those employed. In the average factory, however, while the disability and death rates may be, and usually are, excessive among the group of employees directly exposed, the number exposed constitutes so small a percentage of the total number of employees that this excessive disability rate among the few escapes the attention of those responsible.

A deposit of silica in the lungs can never be removed. Just how much of a deposit the lung tissue will stand and still continue to function within normal limits is very difficult to determine. Two cases recently came under my observation in which there had been an exposure to silica dust between seven and eight years. Both of these men were apparently in good health, but changed their occupations. One man had been entirely away from this dust for eight years and the other for nine years, when both developed symptoms of lung trouble and were found to be suffering from silicosis complicated by tuberculosis. These two cases bear out

the observation of Sir Thomas Oliver, that fibrosis once started continues to progress even after the exciting cause is removed.

While it does occasionally happen that persons suffering from silicosis have only to contend with the lung tissue change due to dust, in the great majority of cases the condition ultimately becomes complicated by an infection. Although it is possible for a man to get a sufficient amount of silica in his lungs to kill him by fibrosis and replacement of the lung tissue, most of the cases which begin as simple silicosis subsequently develop some complicating infection, frequently tuberculosis, and death comes from silicosis plus the infection. The duration of the disease cannot be definitely determined, because it usually happens that the disability incident to the development of the disease comes on so slowly and gradually that it may be years before it is sufficient to compel a man to stop work. Instead of attempting to designate the duration, it is better, for practical purposes, to divide the course of the disease into two periods: first, the period of development, and second, the period of total disability.

The period of development usually extends over a number of years—five to twenty-five. I saw one man who was totally and permanently disabled after one year's service as a sand blast operator. I also saw a wet sandstone grinder who had worked more or less continuously for more than thirty years before becoming disabled. In my personal experience, however, disability has seldom occurred under five years' exposure and usually there has been total disability before twelve years' exposure.

Recently an investigation was undertaken to determine how soon after exposure to silica dust the lung changes could be demonstrated by a physical examination. This investigation was made on men working on wet sandstone grinding jobs, on which, according to clinical experience, it was rare for a man to become disabled in less than five years. In men who were symptomatically and by ordinary physical examination found to be in perfect health a diffuse mottling of both lungs was demonstrable on X-ray plates after one and a half to two years' exposure.

There is a rather wide variation in the length of life after total disability has developed. In comparatively few cases the patients continue to live for some time and death is due to some cause other than the lung condition. It has been my personal experience, however, that the great majority live less than two years after becoming disabled. The length of life seems to be determined largely by the nature and the severity of the infection complicating the silicosis.

Summary

The subject of silicosis is covered in detail and at great length in our literature. The only point which I wish to make, other than to emphasize the seriousness of the condition, is that this condition may be found in almost any modern factory. A careful analysis of all factory jobs is all that is necessary to point out to the industrial physician those on which the development of this condition is possible. It may be that in a given factory there is only one man constantly exposed to silica dust, but it is the duty of the industrial physician to know about this one man and to see that he is properly protected.

A deposit of silica in the lungs can never be removed. More than a cer-

tain amount will eventually cause disability. Cure is impossible. Prevention is not only possible but is the responsibility of the industrial physician. While nearly every modern factory has its danger points, there is no longer any reason for their being continued. The health hazards to the operators on these dangerous jobs can all be eliminated not only in such a way as to protect the operator, but incidentally with a saving in production cost.

NERVE INJURIES*

JAMES H. LEWIS, M.D., F.A.C.S.
Buffalo, N. Y.

HYSTERICAL nervous disturbances are more common as a result of accident in industry than true nerve injuries. Fundamental for differential diagnosis is a knowledge of the anatomical distribution of the peripheral nerves. Hysterical manifestations do not conform exactly to the fields of specific nerves. Glove or stocking type of anesthesia in the extremities, paralysis of muscles supplied by more than one nerve, normal electrical reactions, preservation of reflexes, and absence of appreciable atrophy are characteristic of hysteria. The symptoms of true nerve injury are referable to the distribution of the particular nerve involved. In complicated cases expert neurological examination is necessary.

Nerve injury may occur (1) from bruising, (2) from compression, (3) from excessive stretching, and (4) from laceration causing partial or total loss of continuity.

Symptoms of contusion may be mild and transient, consisting of numbness and tingling and muscular weakness in the distribution of the nerve, or severe, with paralytic symptoms which may last for months. Permanent loss of function is extremely rare. As an instance of severe contusion I may cite the case of a colored laborer who was struck by a bar over the posterior aspect of the internal condyle of the humerus. When he first presented himself for examination several weeks after the injury there was no remaining local evidence of the trauma, the hand had assumed the claw posture, there was marked atrophy along the inner aspect of the forearm, of the hypothenar eminence and of the interossei, and complete motor and sensory paralytic symptoms in the distribution of the ulnar nerve had developed. Of some interest is the fact that there was a sensation of prickling or tingling in the little and ring fingers on percussing with the finger tip over the nerve from below up on arriving at a point half way up the forearm—*i.e.*, Tinel's deep percussion tingling sign of regeneration was present. The man continued at his work and six months after injury there was full return of sensation over the ulnar distribution, and power in the flexor profundus digitorum and the flexor carpi ulnaris was practically normal. Power had also slightly returned in the muscles of the hypothenar eminence and in the interossei and adductors of the thumb. Two months later recovery was complete.

Disturbance or interruption of nerve function from compression may be transient or prolonged for several months or permanent. The prognosis is good when there is prompt recognition and relief from the compression. Bone callus, scars, tight bandages, improperly applied splints, crutches, retractor pressure during operation, and sleeping with the head on the arm are among the causes. Most commonly affected are the musculospiral nerve in its course close to the humerus, the ulnar back of the internal condyle of the humerus, and the external popliteal as

*Read before the Ninth Annual Meeting of the American Association of Industrial Physicians and Surgeons in Chicago, June 10, 1924.

it winds round the neck of the fibula.

Damage from stretching varies in degree. The symptoms are pain and tenderness and those of partial or complete block. It occurs most commonly with fractures and with dislocations (particularly of the shoulder).

Frazier and Skillern (1) in 1911 collected twenty-one cases of rupture of the brachial plexus without skeletal injury. Violence tending to tear the shoulder girdle from the cervical spine results in strain on the plexus, and giving way, if it occurs, usually takes place in the cords of the plexus, the trunks, or the anterior divisions serially from above down. These authors also reported as "unique" a case of evulsion of the anterior and posterior roots from within the dural sac. Specific mention is made of this case in view of a similar personal case to be reported below. Their patient was a physician on whom another man fell from a fourth story window. Three months after injury his pain was terrific, sensation was lost to 2 or 3 inches below the elbow and was impaired to 3 or 4 inches below the shoulder. There was complete motor paralysis of the extremity. The pupil on the injured side was contracted and the palpebral fissure narrowed (Horner's syndrome) — phenomena which Frazier and Skillern regard as conclusive evidence of an intradural lesion. Laminectomy was done to sever the posterior nerve roots for relief of pain, and the lesions were demonstrated. Da Costa (2) mentions a similar case in his textbook, and in 1915 Cadwalader (3) reported a case seen five years after injury and diagnosed as intradural lesion from the eye phenomena and the neurological symptoms but apparently without definite operative confirmation. The case observed by me and never before reported was as follows:

On June 16, 1907, John S., an Austrian laborer, aged 23, extremely muscular and with strong, bony framework, employed as a rigger, was struck over the left shoulder and arm by a flying heavy wire cable. Half an hour later he walked into the hospital but exhibited signs of shock. He complained of weakness in his legs and pain about the left shoulder. There was an abrasion over the shoulder and lower part of the arm and a mark of contusion on the forearm. The extremity hung limp. Slight fulness of the supraclavicular region was noted and pressure here elicited pain which the patient said he felt in his fingers. Motor paralysis of the extremity was found to be complete, including the pectorals, the deltoid, and the external rotators of the humerus. There was also complete skin anesthesia from the finger tips to the junction of the lower third and upper two-thirds of the arm anteriorly and up to within 1 inch of the olecranon posteriorly. Hyperesthesia succeeded the level of anesthesia. The patient stated that he was able to appreciate deep pressure on the forearm. Until the time of the operation, four days later, his condition did not change materially except that the fulness of the supraclavicular region became more marked.

Under ether anesthesia a vertical incision was made through the skin and platysma, crossing the middle of the clavicle and extending 4 inches above and 4 inches below. The external jugular vein, the omohyoid muscle, and the transversalis colli vessels were divided. On incising the deep fascia overlying the brachial plexus there was a gush of about 2 ounces of clear fluid (cerebrospinal) followed by a continuous flow of a little more. The anterior divisions of the fifth, sixth, and seventh cervical nerves were found completely free with frayed ends torn from out of the intervertebral foramina. The clavicle was divided with a Gigli saw, the subclavius muscle and the suprascapular vessels were divided, the pectoralis major was separated from the deltoid, the costa coracoid membrane was opened, the subclavian vessels were retracted, and dissection was carried to the intervertebral foramina between the seventh cervical and the first dorsal vertebrae, and between the first and second dorsal vertebrae. The eighth cervical nerve was still connected with the spinal column by a single fasciculus. The first dorsal nerve was continuous into its foramen but it was pinkish in color, swollen, and soft. Anastomosis of the spinal accessory nerve into the plexus was thought to offer but little. Cross anastomosis of the plexus into that of the other side was considered but dismissed because of

the danger of injury to the sound side and because of doubt as to the possibility of accomplishment. After considerable hesitation the frayed ends of the eighth nerve were tucked into the foramen alongside of the intact fasciculus. The seventh nerve after its shredded end had been cut off was anastomosed laterally into the first dorsal vertebra. Then the common trunk formed by the fifth and sixth cervicals was resected lower down and anastomosed laterally into the middle trunk (continuation of the seventh nerve). Suturing was done with fine chromicized catgut. The clavicle was sutured with silver wire, the soft structures were brought together with catgut, the skin and the platysma were closed about cigarette drains above and below, and dressing including supportive adhesive plaster was applied. The operation occupied three hours and at its close the patient was in good general condition. The wound healed by primary union.

On July 11 it was first noted that the pupil on the injured side was contracted.

On July 17 faradism had ceased to elicit any response from any of the muscles of the extremity. Blisters developed on the ring and little fingers from hot water burns. Atrophy was progressive. The patient left the hospital against advice on July 22 with motor and sensory paralysis as before the operation. He then visited many doctors and tried many kinds of treatments. When seen eight months later there was great atrophy of the shoulder girdle muscles, including the pectorals, deltoid, and spinati, and of all the distal muscles of the extremity. There was great laxity of the shoulder joint, nearly allowing dislocation, and slight laxity of the elbow joint. Motor paralysis was complete as before and there was no change in the sensory findings. The skin of the hand and fingers was cyanotic, and there was partial denudation of the epidermis. Amputation was advised but was declined by the patient.

On October 9, 1909, when the photograph shown in Figure 1 was taken, the patient reported that he was working every day at the steel plant. He had gained considerably in weight. He carried his left hand habitually in his pocket. He said that he had not noticed much change in the extremity till several weeks before when he began to have prickling and pain in his forearm and hand. At the same time bloody blebs formed on the forearm which were opened by a barber. The pain then disappeared and he first noticed that there was some return of sensation and that he could tell hot from cold. Atrophy of the extremity from the elbow down was marked, above the elbow it was moderate. The muscles of the forearm felt fibrous. The shoulder joint was not as lax as it was two years before. The hand was moderately cyanotic and cold. The fingers were flexed at the interphalangeal and extended at the metacarpophalangeal joints.

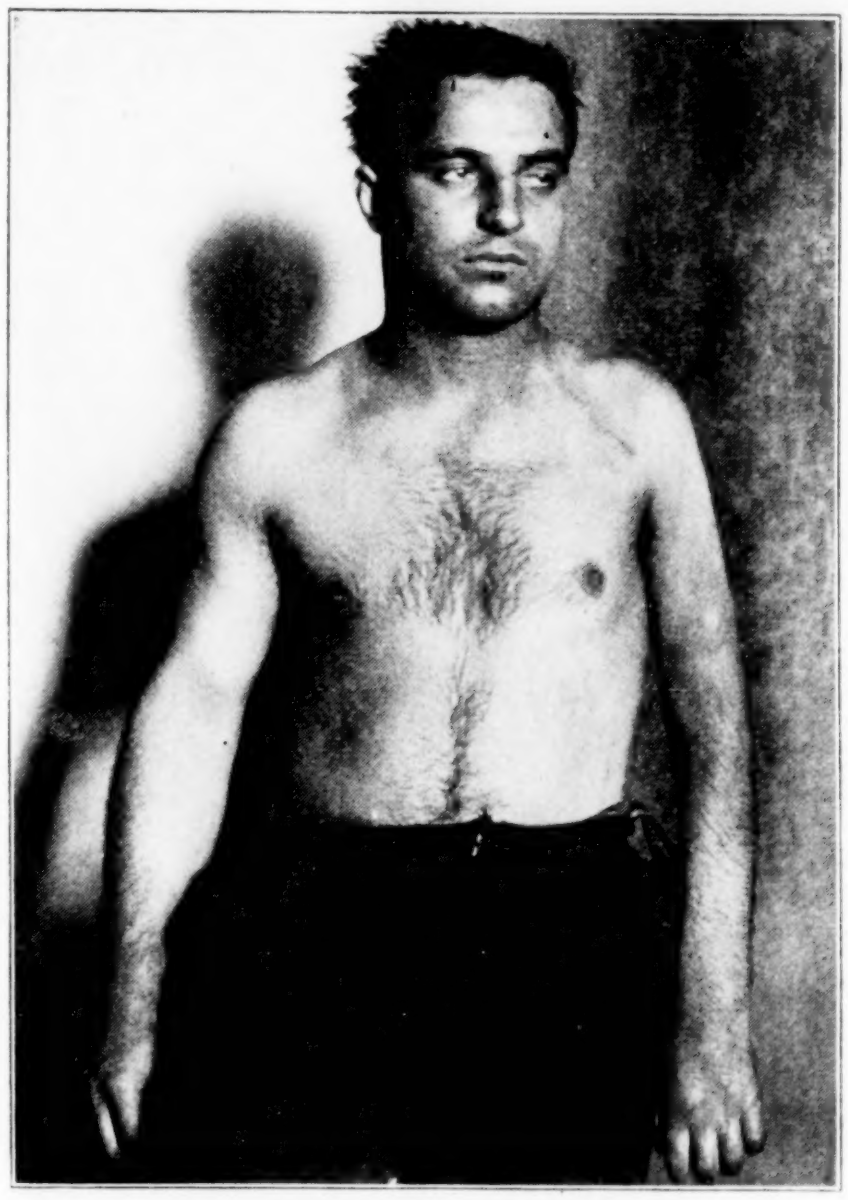

FIG. 1.—J. S. Case of evulsion of brachial plexus. Note enophthalmos, operative scar, and atrophy. Photograph taken Oct. 9, 1909, over two years after injury.

The patient was able voluntarily to contract the pectoralis minor, the triceps, and (slightly) the flexor carpi ulnaris and the flexor profundus digitorum as evidenced by slight flexion of the wrist and of the three inner fingers. No muscles responded to faradism. Pain, temperature and tactile sense with marked hyperesthesia were present along the ulnar side of the forearm and over the little and ring fingers, but no sensation was present over the lower third of the arm anteriorly, over the anterior and radial sides of the forearm and over the thumb, index and middle fingers.

On September 27, 1912, the general appearance of the arm was better. Very slight cyanosis was still present in the hand and fingers. There was great atrophy of the spinati, pectorals, deltoid, biceps, and muscles of the forearm and hand. There was no relaxation at the shoulder joint. The elbow joint was firm. There was slight voluntary

contraction of the pectorals, but none of the spinati, deltoid, biceps and dorsal muscles of the forearm. The triceps was well developed and powerful. There was slight voluntary flexion of the wrist, fingers, and thumb. No voluntary extension of the wrist and fingers was noted. Tactile and pain sense were present over the anterior and the posterior surfaces of the forearm and hand, and over the fingers and thumb with reference, however, of sensation to the back of the forearm on stimulation of the dorsum of the hand and fingers. There was slight ptosis of the left upper eyelid.

In 1920 it was learned that the man died in 1918 of influenza.

Partial or total severance of the major nerves of the extremities in industrial accidents is not common except in traumatic amputations or grave injuries necessitating amputation. In the less severe crushing injuries nerve continuity is usually preserved. Severance may occur with severe lacerations and cuts, from penetration of a sharp object, and from sharp bone ends. As an illustration of partial severance, allow me to cite the case of a young man who in 1918 sustained a clean cut with glass above the outer condyle of his left humerus dividing the musculospiral nerve except for a small strand. There was wrist drop and inability to extend the thumb or extend the fingers at the metacarpophalangeal joints, but there was no impairment of sensation. The severed portion was approximated with fine interrupted silk sutures through the epineurium only. Healing was by first intention. A cock-up splint was worn. In exactly one month slight voluntary extension of the thumb and little finger was noted and at two and a half months the patient was able to extend the wrist, thumb and all fingers to full range with, however, about one-third normal power. He has not been seen since.

The immediate symptoms of total severance are motor and sensory paralysis in the distribution of the nerve affected. In testing for motor paralysis it is to be remembered that some muscles have a double nerve supply and great care must be exercised to recognize so-called trick, substitute, or supplementary movements—for example, adduction of the thumb by the flexor longus pollicis, extension of the wrist by flexing the fingers, etc. The areas of loss of touch and pain sense are not identical, pin prick sensibility as shown by Pollock (4) overlapping to some extent from adjacent areas. Faradic irritability of nerve and muscle is lost in a few days. The reaction of degeneration progresses, characterized as time goes on more by slowness of contraction to galvanism than by polar change. At the end of eight or ten months galvanic excitability is lost (3). Electrical testing and interpreting should be done by a specialist. Atrophy very promptly becomes evident and rapidly progresses. The muscles lose all tone and the characteristic attitudes become fixed by the contraction of opposing muscles, causing, for example, claw hand with ulnar paralysis, drop wrist with musculospiral paralysis and drop foot with external popliteal paralysis. Trophic and vasomotor changes occur. The skin becomes smooth, glossy, and more or less cyanotic, and there is abnormal sweating.

Nerve severance is much more common in the upper extremity than in the lower. Because of associated damage in the latter, amputation is usually indicated. Injuries of the upper extremity demand conservative treatment as far as possible. With so-called wound excision in contused, lacerated, and more or less contaminated injuries we are able to secure primary or near-primary union in the majority of cases.

Bone damage of course adds very materially to the gravity of the condition. The wide débridement as done in war surgery is rarely necessary. Careful preparation, flooding of the wound with half strength tincture of iodine, excision with a sharp knife of skin edge and subcutaneous fascia, and resection of all shreddy and contused tissue will usually give a field in which it is safe to do primary nerve suture.

I have had three cases of simultaneous severance of two of the major nerves of the upper extremity in which primary suture was done. They are as follows:

The first case, P. T., was an American boy, 21 years of age, who on December 3, 1919, while screwing down a grease cup on a coke dust machine had his right forearm caught in the roller. He managed to pull it out and the profuse hemorrhage which ensued was checked by a tourniquet applied by a fellow workman. Half an hour later at the hospital the injury was found to be a contused and ragged U-shaped laceration of the anterior aspect of the forearm at the junction of the upper two-thirds and the lower third, one end of the wound running well up the ulnar side of the forearm and the other over the radial border to the middle of the dorsal aspect. All soft structures anteriorly, except the anterior interosseous vessels and nerve, were severed and greasy dirt was ground deep into the tissues including the cortex of the bones. The parts divided were the palmaris longus, the flexor carpi radialis, the flexor sublimis digitorum, the flexor carpi ulnaris, the flexor profundus digitorum, the flexor longus pollicis, and the supinator longus, both sets of vessels, radial and ulnar, and the median and ulnar nerves. There was complete motor and sensory loss of function in the distribution of the median and ulnar nerves below this level but exact definition of the paralysis was not possible. The tourniquet was released temporarily and the circulation in the hand was found to be apparently good.

Under ether anesthesia the forearm was dry-shaved, the skin was scrubbed with ether, and half-strength tincture of iodine was painted on. The wound itself, including the exposed bone surfaces, was then also washed with ether, and flooded with iodine. The entire skin edge with subcutaneous tissue was excised by a margin of one-fourth inch or more, and dirty, ragged and contused muscle and tendon ends were resected. Both sets of vessels were tied above and below. The shreddy, blood-infiltrated nerve ends (ulnar and median) were steadied with fine forceps catching the nerve sheath only on either side and were cut square across with a safety razor blade, the resulting loss in continuity in each nerve being an inch or more. By sharp flexion of the wrist and some loosening of the nerves in their beds it was possible to approximate the respective ends, and union was effected by five or six fine interrupted silk sutures passed through the epineurium only. Care was taken to prevent rotation of the upper segment on the lower. The muscles and tendons were sutured serially with chromic gut bringing muscle about the suture lines in the nerves. The skin and subcutaneous fascia were drawn together with silkworm-gut sutures and a gutta percha drain placed at either end of the wound. Iodine and dry dressing were applied and the limb was put up on a splint with the hand and fingers in full flexion as it has been possible to approximate the structures only in this position. The operating time was two hours. The splint was removed two days later. The wound healed kindly with no suppuration and on discharge from the hospital two weeks after admission the patient was encouraged to begin with care attempts at voluntary extension and flexion. Six months later there was beginning return of sensation in the hand, and one year from operation full sensation had been regained in the ulnar distribution and there was hypesthesia to both pin prick and touch throughout the median distribution, the impairment of sensibility being most marked in the tip of the index finger. Abduction of the little finger was strong as was also action of the palmaris brevis. There was no action of the interossei and adductors of the thumb and no action in the muscles of the thenar eminence. Atrophy of the interossei and of the small muscles of the thumb was marked. There was moderate restriction of extension of the fingers due to shortened tendons.

On May 8, 1924, when the accompanying photographs were taken (Figs. 2 and 3), sensation was normal everywhere. Voluntary action in the hypothenar group of muscles was strong; there was good power in the dorsal interossei, as evidenced by forcible extension at the interphalangeal joints with the metacarpophalangeal joints flexed and by abduction of the fingers; power in the

palmar interossei as shown by weak adduction of the fingers was poor; adduction of the thumb was strong. That is, all the muscles in the ulnar distribution were innervated (with the possible exception of the two inner lumbricales which could not be tested separately). There was no appreciable atrophy

Fig. 2.—P. T. Case of severance of ulnar and median nerves, and flexor muscles and tendons. Photograph taken four and a half years after primary suture.

of the hypothenar eminence. Atrophy of the first interosseous space was rather marked: that of the other spaces was slight. Atrophy of the thenar eminence was moderate (less marked than a year after injury) and there were visible fibrillary contractions in the muscles but practically no power of opposing. Function in the long tendons was good except for slight restriction of extension due to shortening of flexors. The man is aware of but little loss of usefulness in the hand.

The second case, M. P., was a young man (Russian) employed as a "looper" catching hot bars with tongs in a rolling mill, who, on July 1, 1920, tripped and fell in the way of a hot bar which passed through his right arm inside and behind the humerus, close below the axilla, dividing the musculospiral and ulnar nerves, the long head of the triceps, and the overlying skin and fascia. In the distribution of the musculospiral nerve the motor loss from the supinator longus down was complete so that there was inability to flex the elbow with normal power or to supinate, except for action of the biceps, and inability to extend the wrist and the thumb and fingers at the metacarpophalangeal joints. The sensory loss consisted of

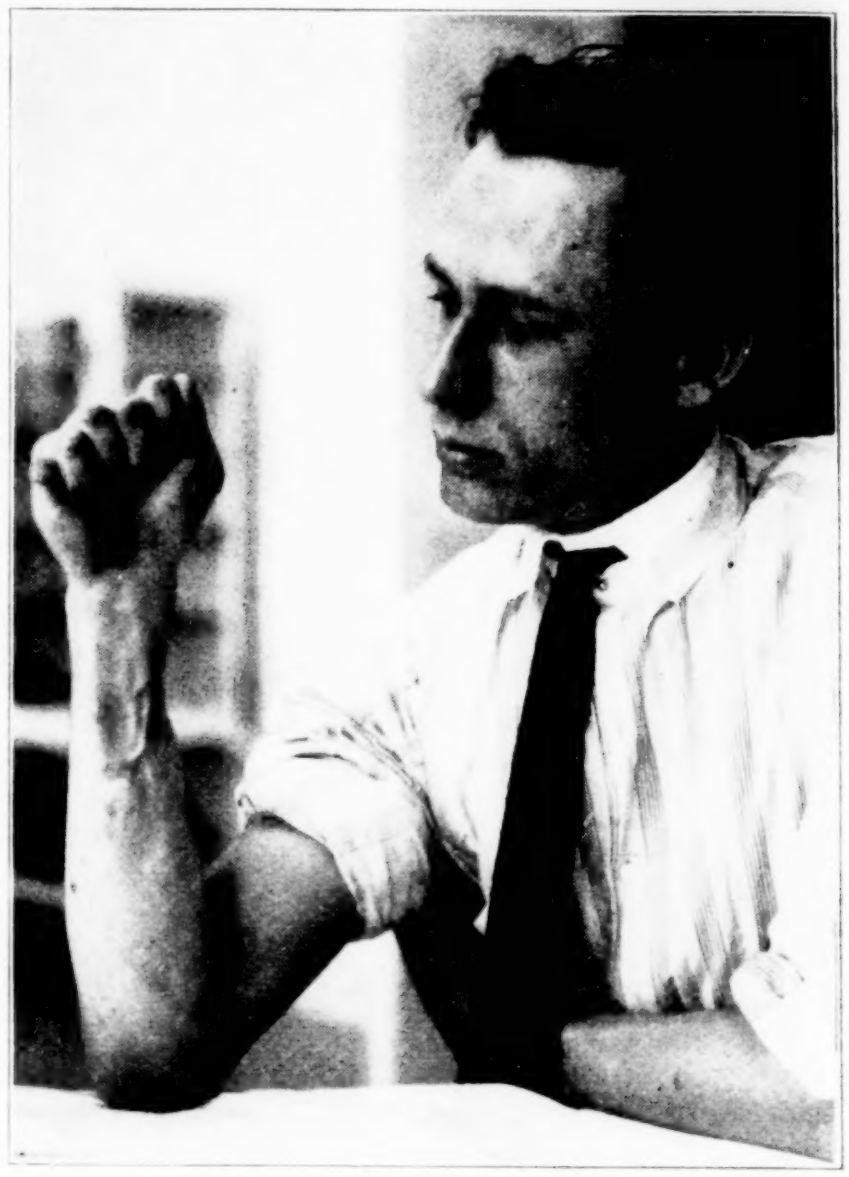

Fig. 3.—Same case as in Figure 2.

tactile anesthesia over the dorsum of the first interosseous space and over the dorsum of the thumb to the distal joint; loss of pin prick sensibility was less extensive, being marked only over the dorsum of the first interosseous space. In the distribution of the ulnar nerve motor loss was complete as was also sensory loss except for some overlapping of pin prick sensibility from adjacent areas. Wound excision was done as previously described, it being necessary because of the burn to remove considerable tissue, including one small strand connecting the ends of the ulnar nerve. End to end suture of the nerves was accomplished, the triceps head was united, and the wound was closed about drains. Healing occurred cleanly except for sloughing of a small area of burned skin where excision had not been quite wide enough. Marked edema of the extremity persisted for months and then advanced muscular atrophy became evident. Fibrous ankylosis of the metacarpophalan-

geal joints of the fingers occurred and, in spite of elastic traction in connection with the cock-up splint, was never entirely overcome. The first evidence of motor and sensory return in the ulnar distribution was noted three months after injury and in that of the musculospiral three months later.

FIG. 4.—M. P. Case of severance of ulnar and musculospiral nerves. Photograph taken nearly four years after primary suture.

Physiotherapy was employed (baths, massage, and electricity) but the man was not regular in attendance and later went to another town for two or three years.

On May 22, 1924, when the photographs shown in Figures 4 and 5 were taken, the general usefulness of the extremity was such that the patient had returned to his occupation of looping. The most serious impairment remaining was inability to extend the thumb, and he was advised to have the flexor carpi radialis transplanted into the long extensors of the thumb. The supinator longus was active but weak, the radial extensors strong, and the extensor communis strong to the middle and ring fingers, extension of the index and little fingers being rather weak. In the ulnar distribution the flexor carpi ulnaris, the hypothenar group, and the adductors of the thumb were strong, the flexor profundus to the little and ring fingers and the interossei active but rather weak. Sensation was everywhere normal except for hyposensibility to pin prick on the tip of the little finger. There was moderate atrophy of the forearm most marked over the lower half of the radius, and also moderate atrophy of the interossei.

The third case was another instance of severance of the median and ulnar nerves very similar to the first case. The patient was

FIG 5.—Same case as in Figure 4.

operated on only last month so that there is nothing of interest to report except that healing is going on without infection.

The pathway for a nerve impulse is the axis cylinder. All we know of the impulse itself is that there is a concomitant electrical change. Individual axons carry centrifugal or centripetal impulses. When the axon is severed, function ceases and within from one to several days Wallerian degeneration is demonstrable in the distal segment. Fragmentation of the myelin and its formation into globules occurs. Later there are changes in the neurolemma and the myelin disappears. The axon is simply a process of the nerve cell higher up, and it has been conclusively

shown by differential silver staining methods that regeneration after severance occurs only by down-growth of axons from the proximal end into the distal segment (5). Whether the old neurolemma sheaths act as conduits for the oncoming axons or whether there is new formation of neurolemma sheaths has not been determined. Ideally for full regeneration the proximal cut end of each axon should be opposed to its own neurolemma sheath in the distal end, obviously a clinical impossibility. On section a typical nerve trunk of the extremities presents projecting fasciculi (eight, twelve, sixteen in number), each fasciculus containing fifteen or twenty to a hundred times as many axons. The circumferential connective tissue covering (epineurium) sends in a supporting framework (perineurium) for the fasciculi. Good-sized blood vessels are evident in the epineurium and the perineurium. The larger intrinsic vessels run for long distances in the nerve trunks, the names of some of them—*e.g.*, comes nervi ischiadici and comes nervi mediani—being familiar to first-year students of anatomy. There is intercommunication between the different fasciculi, a real intraneural plexus formation, particularly about the sites where branches are given off. On section of a nerve trunk, however, a definite pattern is observable in the cut ends, and experimentally by electrical stimulation the different fasciculi are demonstrated to have different functions. It is evident that, after severance, end to end apposition with as accurate matching of patterns as possible would give the best opportunity for regeneration. Fascicular suture would, in fact, be desirable and has been advocated by some (Stoffel, Elsberg), but in the opinion of most men this is beyond the possibilities of practical surgery. Avoidance of axial rotation is the chief factor in securing the coaptation of nerve patterns. Even with the best technic, however, restoration of the continuity of all axons is not to be expected. In this connection a statement by Platt (6) is of interest—*viz.*, that in his whole series of 150 secondary end to end sutures there were no examples of absolutely complete and perfect recovery, excepting possibly in five of the musculospiral and two of the external popliteal sutures. In the secondary sutures of war nerve injuries it was demonstrated that wide gaps could be closed and end to end suture accomplished by employing various expedients (long free incisions, loosening of the nerve in its bed, traction, transplantation, posturing and the two-stage operation), and to a certain extent the same expedients may be employed in primary suture. The old flap operations are altogether unphysiological and any return of function after them must, as has been said (Elsberg), be in spite of and not because of them. Suture *à distance* and tubulization have experimental interest only. Regeneration by way of interposed fresh grafts with return of function was demonstrated experimentally by Huber in 1895 and more recently (7) he has demonstrated regeneration through grafts preserved in liquid petrolatum and in 50 per cent. alcohol. There may be some clinical future for grafting but results up to the present time do not justify its employment if there is any possibility of end to end suture.

Regarding prognosis after primary end to end suture skepticism in accepting the reports of immediate or very prompt return of function is justified. Stiles and Forrester-Brown (8) say that "No reliable case has been found of immediate return of function after

suture, nor of recovery too rapid to be accounted for by the down growth theory.'' The rate of growth of axons is said to average about 1 mm. per day, and return of function is usually noted first in the proximal parts. The interval before the first signs of regeneration are present may be from six weeks to two years or more. Dean Lewis (9) writes that he has observed eleven cases in which primary suture has been performed and that nine months after suture nine of these presented definite evidence of return of motor function. Perfect restoration of function is not to be expected. It is true that in a normal nerve as factors of safety nature has provided different pathways (axons) to the same muscle or skin area but, particularly after removal of a segment, unavoidably the nerve patterns will not exactly match and motor axons will be lost against connective tissue or by passing down a sensory neurolemma sheath, and sensory axons will be lost similarly.

The most convincing sign of regeneration is return of voluntary motion; other signs are return of sensation, improvement in the tone of the muscles, and disappearance of reaction of degeneration and of atrophy. Stookey (5) has shown that Tinel's sign may be present with practically no anatomical continuity and it is generally regarded as unreliable. In the interval of paralysis it is important that proper splints be used to keep paralyzed muscles from becoming overstretched and that the various methods of physiotherapy be employed to promote the nutrition of the parts affected. With some return of motor power, active use undoubtedly most promotes further improvement and this improvement may be expected to progress for years.

BIBLIOGRAPHY

1. Frazier, C. H., and Skillern, P. G.: Supraclavicular Subcutaneous Lesions of the Brachial Plexus not Associated with Skeletal Injuries. Jour. Am. Med. Assn., 1911, *57*, 1957.
2. Da Costa, J. C.: Modern Surgery, General and Operative. Eighth Edition. Philadelphia, W. B. Saunders Company, 1920.
3. Cadwalader, W. B.: Traumatic Separation of the Nerve Roots from the Spinal Cord. Jour. Am. Med. Assn., 1915, *65*, 1793.
4. Pollock, L. J.: The Clinical Signs of Nerve Injury and Regeneration. Surg., Gynec. and Obst., 1920, *30*, 472.
5. Stookey, B.: Surgical and Mechanical Treatment of Peripheral Nerves. Philadelphia, W. B. Saunders Company, 1922.
6. Platt, H.: The Surgery of Peripheral Nerve Injuries of Warfare. Hunterian Lectures, 1921.
7. Huber, G. C.: Repair of Peripheral Nerve Injuries. Surg., Gynec. and Obst., 1920, *30*, 464.
8. Stiles, H. J., and Forrester-Brown, M. F.: Treatment of Injuries of Peripheral Nerves. London, Hodder and Stoughton, 1922.
9. Lewis, D.: Principles of Peripheral Nerve Surgery. Jour. Am. Med. Assn., 1920, *75*, 73.
10. Babcock, W. W., and Bower, J. O.: End Results in 608 Cases of Peripheral Nerve Injury. Penn. Med. Jour., 1920-1921, *24*, 533.

DISCUSSION NOTES

Afternoon Session

Monday, June 9, 1924

President Shoudy: The discussion of Dr. Rector's paper will be opened by one who has had much experience in compensation laws. I take pleasure in presenting to you Mr. George Schneider, a lawyer in Illinois.

Mr. Schneider: Dr. Rector in his paper makes a statement that has started a train of thought in my mind that I cannot permit to go unchallenged. He argues that every compensation case necessarily involves the expression of some medical opinion and therefore medical opinion should be well represented upon the various boards. I regret that I cannot agree with him upon this question. We might just as well argue that where a legal question is presented it might be well to have a jury of lawyers sit on such a case. I am sure that no one would have the temerity to make such a recommendation. Or, to go one step further logically, could it not be argued with equal force that if a carpenter has a claim his case ought to be heard by a carpenter because he is familiar with the tools and customs of carpenters; and so with the bricklayer and the hod-carrier and the plumber and so on down the line? We must bear in mind that workmen's compensation acts have been extended in their application in this country, so that we have salesmen, stenographers, solicitors, clerks, and even officers of corporations coming within the purview of the acts. It is my experience that laymen are a success in reaching decisions on evidence heard.

In my opinion we should have medical directors or examiners acting in conjunction with the boards and commissions. I am unable, however, to bring myself to the conclusion that the medical profession should be represented on the boards as members. I believe that if the board has a physician or surgeon sitting on the board as a member the force of his knowledge would be entirely lost because in that capacity his time and his experience would be taken up a great deal with routine matters that would diminish his value as a scientific factor on the board.

In a great many states where the commissions or boards have taken the place of the courts in disputes between master and servant, it might be well to argue that such boards ought to be constituted of lawyers or judges. I am not in favor of that at all. I do not believe that a lawyer on a board does the board any harm, and I do not believe that he does the board much good. It would be a calamity, to my mind, were the commissions to be constituted solely of lawyers and other professionally trained men, who indulge in technicalities and in logical high-jumping, to the detriment of the injured working-man, and lose sight of the one matter in hand: Did the man sustain an accidental injury that would entitle him to compensation?

I am heartily in favor of having a well-qualified physician or surgeon connected with the board. This person should be a highly specialized expert who can act in an advisory capacity. He must by nature be adapted to this kind of work. He must be a physician who has met people and who knows human nature. Such a doctor must have a very broad education. He must be able to diagnose a traumatic neurosis. He must be able to pick out the malingerer as soon as he sees him. He must be able to read an X-ray. He should be gifted with rare judgment—not the kind that wants to perform an exploratory operation as soon as he is unable to understand the case. And he must have persuasive powers. He must be able to command the confidence of the working-man and the employer. He must have the honesty of the ideal of Diogenes. He must be able to sympathize with the working-man who is going to a chiropractor or osteopath or Christian Science practitioner, or to one of the disciples of Abrams. Moreover, he must possess the quality of giving the right information to the commission regardless of his sympathies. I admit that I am probably painting a picture of something that does not exist, but the doctor who makes a success as advisory physician to a board or commission will have to embody all of these qualities. . . .

The question of fees is one that may be passed over lightly because a man who possesses all of these qualities is priceless. In my opinion, it would be inadvisable for a physician of the board to take any part in adjusting fees. These matters can always be adjusted by a layman on the basis of evidence. The sense of values of doctors will often differ, and it would be a burden to ask a professional man to adjust claims between a physician and an employer. In my opinion, fees ought to be measured by the success of the work. You cannot expect a surgeon who has to amputate fifty legs at $10 a leg to do the same skilled work that a surgeon can do who charges $100 a leg and does only five operations or amputations a day. The same is true as to first aid. If you expect the physician to do a careless job then you can pay him $2 for the first dressing and take the chance of an infection. But if you want good work done, pay him $10 or $15 and let him do a real aseptic job on the first-aid work. Therefore, it has always seemed nonsense to saddle the professional with the burden of determining what a colleague's work is worth.

The provisions requiring unlimited hospital and surgical services are not necessary in the establishment of the employer who treats his employees right. Such an employer will try to get away from human wastage. He will try to give his men the best that there is in the way of medical treatment in order to get them back to the work as soon as possible and save the difference in the amount of compensation that he would have to pay for the temporary total disability during the healing period. Although few of the acts provide for prosthetic appliances, employers very frequently furnish these voluntarily to the injured employee. In some states there are provisions in the statutes empowering the welfare department of the state to obtain crutches, false teeth, glass eyes, and other equipment for the injured employee.

J. I. H.
Sept., 1924

Any workmen's compensation act which permits an employee to select his own physician is fundamentally wrong. At the present time, the bulk of our laborers are either foreigners or ignorant people. They too easily fall into the clutches of quacks. I do not know whether the physicians in the states where the employee can make the choice have organized a corps of ambulance chasers or business getters, as our ambulance chasing lawyers call it, but the situation offers wonderful opportunities. For this reason I am against it. The employer under the provisions of the workmen's compensation acts in most of our states is interested in getting his injured employee back to work. There are reasons for this:

1. He trained him for that work.
2. He has to take another man and train him. (Waste.)
3. He has to take another man from some other work as a substitute. (Waste.)
4. He must pay compensation while the man is not working.
5. If he hires another man, there is labor turnover. This is waste and poor business.
6. If he does not replace him, there is a gap in the organization.

For these reasons we can see that the employer is vitally interested in having the best physician attend his injured employee. An incompetent physician is a costly luxury. He will probably permit an infection to develop with the attendant loss of an arm or leg. This seems a big loss in compensation payments and more waste in the industry.

A right of action against a careless physician for malpractice is an unsatisfactory way out of the dilemma. In the first place the law of malpractice allows the doctor to clear himself unless he is grossly negligent. The most inefficient physician can almost always show that he made an error of judgment. This lets him out. My remedy is this: Keep the standards of your profession so high that none but the best get licenses to practise medicine. Progress with the modern methods, keep up with the latest thoughts, have your societies discuss means and methods of improving conditions. Medicine is becoming more of an exact science every year.

The suspension or reduction of compensation cannot be too drastically enforced. Where an employee refuses to follow the instructions of the doctor, assuming that the doctor is giving the right kind of treatment or suggesting the proper kind of operative procedure, he should be compelled to accept them at the risk of losing his compensation. It is the only way to control the ignorant and the only way to stop the malingerers, or the person who keeps his condition aggravated solely for the purpose of getting compensation. In my opinion, this provision compelling operative procedure by suspending compensation has led to more hernia operations than all the persuasive powers of the collective body of industrial physicians and surgeons could have accomplished.

I agree with Dr. Rector that legislators generally make a botch of anatomic descriptions. Remember that some of these laws are drafted by the labor organizations and then sent to the legislature for passage. It is strange, but true, that our legislative bodies are too busy to consider carefully the various provisions of an act, and if the boss says that it is all right the act goes through no matter whether the technical provisions in it are correct or not. This is a matter of revision, and I believe that in the future we shall find compensation acts that have been corrected by men who are familiar with anatomic terms.

The labor organizations are unalterably opposed to physical examination of the employee at the time he enters an establishment. There are some plants that insist on a physical examination. What is to be gained by a physical examination under the present construction placed on workmen's compensation acts? The rule is that the previous physical condition of the employee is unimportant so long as the injury sustained is the proximate cause of the incapacity. If the employee has tuberculosis, syphilis, hardening of the arteries, or some other ailment, and the exertion of the employment causes incapacity, or if he sustains an accidental injury which lights up the condition from which he is suffering at the time that he enters the employment, the employer is chargeable with the consequences that follow from his physical condition as the result of an accidental injury. The employer who requires the physical examination of applicants can, of course, reject the physically unfit, but they will probably be absorbed in other industries so that in the long run the ultimate consumer will have to pay for the cost of the injury to the physically unfit. At least that is the theory of the Workmen's Compensation Act. The cost of obtaining physically perfect employees would probably exceed the cost incidental to the employment of men with preexisting diseases. I do not know what statistics show, but I will venture to guess that it is impossible to get 1,000 perfect physical condition specimens together in any plant without some difficulty. Thus the employer would be confronted with the question of labor turnover in this particular situation.

Dr. Rector must have reference to the states of California, Colorado, Connecticut, Iowa, Massachusetts, Montana, New Hampshire, Ohio, Texas, Washington, West Virginia, and Wyoming, and to the Federal Act. He states that in certain commonwealths "personal injury" as defined in the law does not include disease or infection. This is a statutory definition that has, however, been extended by the courts. A far greater number of jurisdictions use the term "personal injury by accident" or "accidental injuries." There are some who have endeavored to put this construction on the word accident;" "An unexpected or unforeseen event happening suddenly and violently, with or without human fault, and producing at the time objective symptoms of an injury." Where the word "injury" has been used alone, as in the Massachusetts Act, it has been given a broader meaning. In other words, the term "injury" includes all accidents, such as lead poisoning, but the term "accident" does not include all injuries.

The Massachusetts court said:[1] "Under the Act, 'personal injury' is not limited to injuries caused by external violence, physical force, or as a result of accident, in the sense in which the words are commonly used and understood, but under the statute is to be given a much broader and more liberal meaning and includes any bodily injury."

In my opinion, the courts have failed miserably in trying to distinguish between disease and accident, infection and accident, and aggravation or acceleration of latent diseases and accident. Even in those states where compensation is only awarded where an employee sustains accidental injuries arising out of and in the course of the employment, the courts have stretched their legal imaginations and have done violence to logic in order to award compensation. Or is it, perhaps, the fault of the expert who can always see some connection between a traumatic injury and the resultant condition? Has he influenced the courts into writing some of the decisions that seem ridiculous to lawyers in the light of the old common law decision and to physicians in the light of their scientific knowledge? Time after time, there are brought to the attention of the lawyers cases where the doctor has made a diagnosis of the condition of the employee as a disease and then, to the astonishment of the doctor who has made this diagnosis for the employer, a physician appears for the employee who testifies that the disease was aggravated by an injury. I believe that the fault to a great degree lies with the doctors, but I will also lay some of the blame at the feet of the courts.

Here is what the Connecticut court said in Ahern *v.* Spier, 93 Conn. 151:

"Personal injury within the meaning of the statute is a bodily injury due to accident. We define an accidental bodily injury as a localized abnormal condition of the living body directly and contemporaneously caused by accident; an accident is an unlooked for mishap, or an untoward event or condition not expected. The concurrence of accident and injury are conditions precedent to the right to compensation."

Another definition, by the Indiana court in Kingan *v.* Ossom, 121 N. E. 289 (Ind. App.), is as follows:

"The fact that appellee was suffering from a mental or nervous condition resulting from a physical injury, rather than from the physical injury itself, cannot have the effect of relieving appellant from responsibility. This court is committed to the doctrine that a 'personal injury,' as that term is used in the Workmen's Compensation Act, has reference not merely to some break in some part of the body, or some wound thereon or the like, but also to the consequence or disability that results therefrom."

The Illinois Supreme Court made the following statement in a case of ruptured aorta, Baggott *v.* Ind. Com., 290 Ill. 530, 534; 125 N. E. 254:

"Relating the hemorrhage to the physical exertion, rupture of the aorta by force from within was as distinctly traumatic as if the canal had been severed by violent application of a sharp instrument from without, which gave it all of the attributes of an accident, of something extraordinary and unforeseen."

And in City of Joliet *v.* Ind. Com., 291 Ill. 555, the court said:

"A sun-stroke is an unexpected and unusual happening and if it befalls one in the ordinary course of conduct, it is an accident."

Could we not argue with equal force that pneumonia is an accident if we are in a position to show lowered resistance as the result of work, by urging that when the pneumococcus attacks the membrane or whatever it attacks this is a sudden unforeseen event arising out of the employment? The attack is certainly sudden enough to make it fall within the classification of something unforeseen. Is it not just as logical to consider this an accident as to consider the rupture of the aorta an accident? The authorities are in hopeless conflict as to whether compensation should be allowed in pneumonia cases. Suffice it to say that it has been allowed in a great many cases.

I cannot bring myself into agreement with Dr. Rector on the plenary powers of the commission over doctors' fees. I do not believe that the commission or board ought to have the power to fix the fee simply because a doctor renders service to any employee who is under the provisions of the Workmen's Compensation Act, unless there is a clear understanding between the employer and the physician that such is the intention of the parties. Such a rule would violate the constitutional provision that the right to contract shall not be abrogated. In my opinion, a physician who treats an injured employee without reference to the Compensation Act, or in the absence of an understanding or agreement with the employer that the service is rendered under the Act, should still be in a position to enforce his contractual rights against the man at whose instance and request the services are furnished, the Workmen's Compensation Act of that state notwithstanding.

I am not a believer in a fee schedule that is uniform. A fee schedule adopted by a state might be too low to compensate the city physician for his tremendous overhead expense and too high properly to compensate the country doctor. So if the Compensation Act is to fix the fees, I would leave the fee for the determination of a commission composed of laymen in each individual case, the amount to be fixed after hearing the evidence. That is the only fair and equitable arrangement.

It is my opinion that occupational diseases will soon be covered by the compensation acts in those states which have not yet legislated on this subject. We will probably also have an Old Age Benefit Compensation Act and a Sickness and Health Insurance Act before many years pass. The step after that will probably be unemployment insurance. If the trend of the times continues, where the state statutes have not made proper provision to cover occupational disease the courts will frequently compensate for occupational disease on the theory that it is an accidental injury. That is what the court did here in Illinois

[1] Johnson *v.* London Guarantee, 217 Mass. 388.
In re Madden, 222 Mass. 487.
In re Hurle, 217 Mass. 223.

in a case of lead poisoning. It maintained that on the basis of the particular facts and circumstances in the case lead poisoning was an accidental injury, and it awarded compensation. It reached the same conclusion in a case of anthrax. The Occupational Disease Amendment passed by our legislature was held void and unconstitutional so the doctor is wrong in stating that there is a provision in the Illinois Act providing for occupational disease. I believe that we ought to adopt an act similar to the British Act and compensate for occupational diseases. The act should be definite and properly passed, however, and not the hodge-podge, crazy quilt affair that we now have on our local statute books.

I want to take a few minutes of your time to enumerate some of the diseases that have been held to be compensable under the Compensation Act in various states:

abscess
actinomycosis
aneurism
anthrax
appendicitis
apoplexy
artery rupture
arteriosclerosis
asphyxiation
asthma
bends
blood poison
blood vessel rupture
boils
brass poisoning
Bright's disease
bronchitis
burns
cancer
carbuncle
cellulitis
cerebral abscess
cerebral hemorrhage
cerebral edema
colds
concussion of the brain
delirium tremens
dementia praecox
dermatitis
diabetes
dislocation
dizziness
dog bite
drowning
dust
dysentery
eczema
embolism
epilepsy
erysipelas
facial paralysis
falls from vertigo
felon
flatfoot
floating kidney
frost-bites and freezing
friction injuries
gangrene from wound
gastric ulcer
headaches
heart disease
hemorrhage
hemorrhoids
hernia
house-blindness
infection
influenza
ink poisoning
insanity
insect bite
ivy poisoning
lead poisoning
lightning
lumbago
malarial fever
meningitis
mental shock and nervous trouble
mitral regurgitation
myocarditis
myositis
nephritis
osteomyelitis
osteosarcoma
palmar abscess
paralysis
periarthritis
peritonitis
pleurisy
pneumonia
rash
rheumatism
St. Vitus' dance
sarcoma
scarlet fever
sciatica
septicemia
skin affections
tetanus
trachoma
tuberculosis
tumor
typhoid fever
ulcer
vaccination
varicose veins
vertigo

In addition to these diseases there are undoubtedly a great many others. I have taken the foregoing list from adjudicated cases that have reached an appellate court where the decision is reported.

I would not have the temerity to discuss hernia. The medical profession is in such turmoil over this subject that it is not within the province of a layman to discuss the pros and cons of this subject under the Workmen's Compensation Act. As to my own views on the subject, suffice it to say that I fight most of these cases if the patients do not submit to an operation.

Re Suggested Medical Provisions

I regret that I cannot find myself in accord with Dr. Rector in his suggestion that at least one member of the board should be a physician. I believe that the physician's work will be more effective if he serves in an advisory capacity. I am in accord with his idea of a consulting staff, but I believe that more could be accomplished if the members acted as consultants to a doctor who is merely the medical director and not a member of the commission. Suppose that we had a condition such as is found in Iowa where the chiropractors hold and wield enough power to get one of their members on the board. Where would the physician and surgeon be? Of what value would their evidence be in a case?

The idea that the fees ought to be paid by the commission is a good one. You cannot help but find a little bias in favor of the person who pays the fee. I would go a step further. I would have the commission or some other department of the state supply the prosthetic appliances and maintain a hospital or institution for the rehabilitation of injured workmen. This may sound socialistic but I believe that a great deal of the wastage in industry could be rehabilitated so that self-respect would be reestablished in the worker and his family saved from poverty, the breeder of crime and vice.

Again I must disagree with Dr. Rector upon the practicability of his suggested plan of a fee schedule. Such a system is too inelastic. I believe that every employer or employee will willingly pay a substantial remuneration to the physician who gets good results.

As to compensation for members that have been amputated, I submit a different plan. I do not know whether it would be a practical one. In my opinion, the loss of a leg or a hand is a more serious matter to a man in the early twenties than to a man who is in the sixties and whose working days are almost over. I believe that a younger man ought to receive more for the loss of a member than an older man. The question of function of the remaining part ought to be taken into consideration but in my opinion it will be a very difficult matter for commissioners and board members to measure the function of such remaining member. I believe physicians would also find themselves in disagreement.

Autopsies should be performed in all cases. We rely too much on clinical pictures; they are an uncertain method of determining causes. Autopsies are the only certain way of determining the cause of death, and I believe that they should

be compulsory in all cases where there is the slightest indication of industrial accident. I tried a case recently where the coroner's physician, together with the attending physician, made a diagnosis at the postmortem that the man died with a fractured patella. He had been operated on, had had a relapse, and one morning he had a siege of unconsciousness and died. The coroner's report did not sound good to me, and so I called in another doctor and we went over the case and he suggested another postmortem.

The body had been buried for six months but we dug it up and started another postmortem. It developed that there was a case of thrombosis in the iliac vein which went on up through the aorta. When the coroner saw that he called the coroner's jury together and frankly told them that he had been in error in the previous findings and instructed them to change their report, which they did. That case is one that clearly shows the value of a postmortem. The doctor for the employer had been certain from the clinical picture that the deceased had died from a cerebral hemorrhage in the fourth ventricle, which was afterwards disproved.

Diseases of a contagious, communicable, or mental nature have no place in compensation acts. But what are you going to do where there is a showing that the disease would never have manifested itself but for the accidental injury — in other words, where the disease of the kind described was lighted up, accelerated or aggravated by the traumatic injury? In my opinion, under such circumstances you will never be able to get the courts away from the decisions already handed down that such cases are compensable.

There are many conditions that ought to be changed, and the members of the American Association of Industrial Physicians and Surgeons can do much toward remedying them. You can keep the standards that you have adopted in the clean, unsullied position that they are. You can do much to bring light and truth to these questions that every day mean so much to the employer and the employee. You can educate the people and ameliorate conditions so that it can be said of each one of you in arriving at a decision or conclusion in a compensation case: "He never sold the truth, to save the hour."

President Shoudy: I wish to thank you for coming up here and giving us this discussion.

The paper and the discussion are now open for discussion from the floor.

Dr. Patterson: I wish to congratulate Dr. Rector and Mr. Schneider on the papers we have just listened to. At the next session of the Pennsylvania legislature, occupational diseases are going to come up, and I am particularly anxious to write occupational diseases into the act. We have arrived at the conclusion that at the present time it is far better in most cases simply to pay the employee his claims than to try to beat the case. In other words, a man who has had great trouble with hernia is entitled to have proper compensation. As far as I know, that has never been written into the act concerning rehabilitation, and I hope that we can absolutely tie this rehabilitation act up with the compensation laws in Pennsylvania. I hope that we are going to have closer contact between rehabilitation and accidents than we have had before.

President Shoudy: Is there any further discussion?

Secretary Cranch: Just one remark with reference to physical examinations and their bearing on the compensation act. I am afraid that some might gain a false impression as to the object of the preliminary examination, and think that everyone not 100 per cent. perfect is rejected. I think that is the prevailing idea in labor circles—that the employer expects to reject everyone who is not 100 per cent. perfect. Then Mr. Schneider's second deduction is correct. Those men have to be absorbed somewhere. As a matter of fact, in most industries where preliminary examination is made it has two prime objects—the proper placement of partially perfect men, and the establishment of a basis for preventive work by which the partially perfect man can be made more nearly perfect.

In regard to the placement proposition, I have yet to see the 100 per cent. perfect man. I do not believe that I have ever come across one of them. Scarcely 50 per cent. of the applicants for work even approach a general average where nothing would be recorded against them. At least 40 per cent. have defects of one kind or another. If we take a man into employment who we know has a heart lesion, we might put him on a job where he might cause an accident which would necessitate the payment of considerable money; whereas if we place him in some position where he is safeguarded properly he will get along all right. I believe that is the prime value of the preliminary examination.

With regard to the grouping of old age and health insurance, I do not think that grouping should be made at all. Compensation laws as operating now place the cost of production on the product whether those costs are mechanical or human. Health insurance, however, is a different matter. . . . That should not be charged to industry as such. The same applies to old age insurance. That is purely a social matter and ought not to be charged to industry.

Dr. King: There is a question in Dr. Rector's paper that I think most of you should give a little thought to. That is, that there are four states which give the injured employees the right of action for malpractice if the results are not satisfactory. In Illinois we have been getting away before the courts with the argument that if the man was injured and was compensated for that injury, the doctor was let out of the case. We have had that ruling, I think, in three cases down state, outside of Chicago. Just recently, however, we tried that argument before Judge David in our local courts here and he would not listen to it at all, and the case now has gone up to the appellate court, so we in Illinois may be confronted with that same thing.

President Shoudy: The next paper is "Problems of Sanitation in the South," by Dr. S. R. Benedict, Chief Surgeon of the Alabama Power Company, Birmingham, Alabama.

Dr. Benedict read his prepared paper after which he showed several charts representing health conditions in the South as compared with those in the North.

President Shoudy: I am sure that you enjoyed Dr. Benedict's paper on the South, and I am sure that he has brought to you a problem with which the industrial men of the South have to contend. I am glad that I am responsible for his coming to this meeting. We are fortunate also in having some one to discuss Dr. Benedict's paper who, I think, needs no introduction to any doctor present, and who probably needs no introduction to anybody who is interested in this subject. I take great pleasure in presenting to you Dr. W. A. Evans, *Tribune* Health Department, Chicago.

Dr. W. A. Evans: Mr. President and Gentlemen: . . . I was born in Alabama and I do not quite agree with Dr. Benedict's first paragraph about Indians and wild beasts in the woods. I do agree, however, with those health officers of the South who have accomplished so much. I do not know that I would agree with Dr. Benedict in listing the diseases as he did: malaria first, hookworm second, and typhoid fever third. This order was not even borne out by the charts that he showed. The saving point in his remarks was the statement that these diseases were of maximum importance because of their effect on efficiency—because they rendered people inefficient rather than because they produced death. The great function of the medical profession in relation to maintaining efficiency as contrasted with curing disease or preventing death is something that I don't think it understands even in part.

Dr. Benedict said that he did not understand why it was that people had to be forced to do that which was best for them. Neither do I, but it is a fact and always has been and always will be a fact that they are frequently under the necessity of compulsion before they will do that which is best. You who are industrial physicians have an enormous advantage not only over the ordinary practitioner of medicine but over the ordinary health officer in that you do not have to convince the people in general of the advantage of a certain line of procedure. You have to convince a board of directors, or one of the executives, or the general manager, or somebody in authority, and that is all. Having convinced that one person you are enabled to get that which is tantamount to law and the endorsement of law far more effectively than can ordinarily be accomplished in the free self-governing commmunity. Not infrequently you have behind you just the kind of aid that Dr. Benedict referred to. Occasionally you have not. When you go before the president of a company and have an idea for the prevention of $1,000,000 of damage suits you don't have to be very forceful in order to carry your point.

Dr. Benedict brought out two very interesting points as to the future—the proper procedure for holding down typhoid fever and the proper procedure for controlling malarial fever. In contract work among people living in camps, the way to get the best hygienic requirements is through the general filtering of the water with hydrochloride. I know of nothing more frequently neglected in this country. People, companies, great organizations will be careful with the work that is being done around the home plant and in the general office, will be careful about their bridge crews, their construction gangs or their field crews in general, and then will neglect the work for the prevention of malarial fever.

The proper procedure for the control of malarial fever opens up several points. First, it is largely due to this company of Dr. Benedict's that we know as much as we do about controlling malaria in the vicinity of impounded water. It was the men connected with the Alabama Power Company who worked out the methods of controlling malaria in such vicinities—methods that have proven so successful in the last few years. They have proceeded on the principle that even in the state of Alabama and very far south the time has come when we can consider that neither the general population nor the general expanse of the country is infected with malaria. . . .

I can readily see how they could get all their employees in the camp to take quinine but I cannot understand how they got all the people from the surrounding country to do it. Dr. Benedict told you that they made those people take enough quinine to cure acute malaria and then made them sign a written agreement to continue chronic treatment for the complete cure before they let them out of camp. I should like to have Dr. Benedict enlighten us as to how they persuaded those people to sign on the dotted line.

The prophylactic use of quinine has, of course, been very much discussed. It was quite in vogue when we started work at Panama. You will also remember that the Italians wanted the use of quinine as a straight procedure, government issued, government sold, and government made, as a measure of checking the malaria of the marchers in and around Rome. At the present time it is not very much used. I have not heard a person speak recently on the subject of malaria control who has expressed much approval of the use of quinine as a prophylactic. It is even said that well people who take quinine as a prophylactic can carry a variety of malaria plasmodium. . . .

I am sure that a great many of you here can use Dr. Benedict's arguments to advantage with your companies. I thank you.

President Shoudy: Do you want to answer that question, Dr. Benedict?

Dr. Benedict: I want to express to Dr. Evans my very great appreciation of his discussion. I felt very gratified when I saw that he was down for the discussion of my paper. I appreciate the fact that he knows more about sanitation than our fellows will ever know. Sanitation is a hobby with me.

I am glad he asked how we got these people to take the quinine. There was a good old fellow who worked on the Panama Canal, one of the best fellows I ever saw; everybody liked him. He was not a doctor, but he knew sanitation pretty well and he came from Gorgas and was down in Chickasaw. I was down there when he arrived. He seemed to be able to get things done, so I

hired him right away. Generally he got those people to take the quinine, and they urged the children to have blood smears made. He put on old clothes and stayed with those people. He lived for ten solid days with one family and paid board to get records and persuade them to take quinine. There was only one family that he could not get to take the quinine. . . .

I got the quinine treatment directly from Dr. Bass, and I think it is hardly fair for me to accept any credit. Dr. Martinez, of Cuba, and Dr. Bass, of New York, are largely responsible. . . .

Relative to physical examination, I wish to say that we require every employee to be examined, and we have a very competent fellow doing the examining. We have no hernias in the company. We had seventy-five when this rule was put into effect, but the men have been operated on and those who are living have returned to their work.

Pres. Shoudy: . . . The next paper is "Rehabilitation of the Disabled from Industry," by Mr. R. M. Little, Chief of the Division of Vocational Education, Albany, New York. I have known Mr. Little personally for some years and I want to assure you that it is a pleasure to present him to you.

Mr. Little read his prepared paper.

President Shoudy: Mr. Little's paper will be discussed by Dr. Ryerson of Chicago.

Dr. Mock: Dr. Ryerson is not here and I am going to open the discussion. I have been around the country a great deal talking to doctors on this subject and I find that they don't know very much about it. Rehabilitation is just a word to them. Fortunately, as Mr. Little says, they are beginning to understand a little more about it.

The first point I want to bring out is this: Is rehabilitation of the disabled really an outgrowth of industrial medicine and surgery? It goes back to the injured employee who has worked for the company ten years, is hurt, and is unable to go back to work; what will you do with him? Before industrial medicine existed he was put on as a watchman. The principal object of the doctor is to make him as nearly whole as possible so that he can go back to work and the company can put him on a job as nearly as possible like his old job, if he can't hold that. That has grown out of the work for the disabled soldier. We have learned two things from the treatment of disabled soldiers: (1) The army doctors tried to treat them as a group, and this is impossible. It is an individual proposition with everyone. (2) After the army doctors and laymen had had these disabled soldiers under treatment for a while they would ask them: "Are you cured as far as it is humanly possible to do so?" The soldiers would say "Yes," and as a result between 60,000 and 80,000 disabled soldiers were scattered all over the country before any adequate machinery in the government had been set up to register them, and for the next two or three years they were trying to find these disabled men.

It makes me blush to have a layman come before us and be forced to say that our work should be criticized. It is true because the majority of us have been thinking of the surgical and medical end-result and we are just now learning to think of the economic end-result. When we think of the economic end-result these are some of the things we will do:

Since the war I have been looking to the community instead of to one industry. If you have a hospital and can see all these cases, inquire what becomes of the men when they are discharged. We have established a follow-up clinic that meets every Sunday morning to check up the men and take care of those who need supervision. We see that they are placed on jobs where they will not break down again. It is the same in the surgical department.

Another thing that has come about after thinking about the economic end-result is that we cannot treat the men as we used to. They used to sit around reading or playing cards until the injured member was well enough for them to be discharged. Instead of that we have started in with occupational therapy, and just as soon as the men can leave the hospital and the hospital care they are discharged.

Our next job is to have a convalescent set to light work along the lines of his former occupation. To help the patient get ahead as fast as possible we have physiotherapy institutes where he can go for physiotherapy. To meet the needs of the patients who are handicapped by their injury we now have fifteen organizations made up of what we call the Conference Committee for the Prevention of Disability and Care of Disabled. We have a little workshop for these patients and we are now voting money for a big workshop where we can demand that the state pay for their training. Unfortunately Illinois has not done what New York has done. It cost us up to last year $1100 to train. We do not have the big men at the head of this work in Illinois that they do in New York State, Ohio, Pennsylvania, and other states. There is too much politics. When we do get our plans materialized, we can say that in Illinois every man is being rehabilitated and that our profession is looking forward to the economic end-results instead of the medical and surgical end-results.

This is my hobby, and I just want to recite to you my creed of the disabled:

"Once more to be useful, to see no pity in the eyes of my friends, to be released with commendation, to produce, provide, seeking no favors and giving none, a man among men instead of being handicapped."

Dr. Patterson: That is also one of my hobbies and I am glad to say that one of the things that I had more or less a hand in in Pennsylvania and New Jersey was the rehabilitation laws of those states. I should like to emphasize that compensation laws as far as they go are all right but I don't think that a monetary compensation can repay a man for his injury and replace him in his job again until we get our compensation laws and our rehabilitation laws tied up absolutely so that they are inseparable. Until we can do that I don't think we are going to do what is right for the man who is injured in industry.

The minute a man is able to get under re-

habilitation he ought to be started in on it. I am glad to state that in the last six months one of our greatest industries, the Pennsylvania Railroad, has had the foresight to put in a rehabilitation department. An employee is brought into contact with rehabilitation conditions and when he is able to return to work he is placed on his old job.

It might interest you to hear a story of the war. I think one of the men to whom we owe most, those of us interested in rehabilitation work, is Dr. Tait McKenzie. He received a commission in the Canadian overseas troops and was soon sent across. At the time of the first battle of the Marne the hospitals were all filled and some of the wounded men were sent across to England and placed in country estates. Dr. McKenzie had not been overseas long when he was called upon to see what he could do toward establishing some rehabilitation work. He told this story of how these poor, wounded men were taken care of in the country estates, explaining that it was the custom of the English ladies to come and sit by their bedsides and talk to them, for censorship was very strict at that time. He said that there was one poor Tommy who was sent out there from the battle of the Marne and was taken to the house of the Duchess of Manchester. He was lying on the sofa, his face covered with bandages and only one eye showing. The dowager came in and sat down alongside of him, pulled out her lorgnette, looked him over very carefully, and finally said, "My good fellow, where were you hit?"

The Tommy looked her over with his one eye and said, "My good lady, I was shot in the foot but the bandage slipped up."

Now I don't want the bandage to slip. Let's see that we tie this rehabilitation work up properly.

President Shoudy: The last paper on the program this afternoon will be "The Industrial Physician and Preventive Medicine," by Dr. John Dodson, Editor of *Hygeia*.

Dr. Dodson: Mr. President and Members: I was privileged to be an observer at the birth of this organization when it was first started by Dr. Mock and others of you here today, and it is evident that it was a lusty infant and has thriven mightily.

Dr. Dodson read his prepared paper.

President Shoudy: The discussion of Dr. Dodson's paper will be opened by Dr. V. S. Cheney, Armour and Company, Chicago.

Dr. Cheney: I don't agree with all that Dr. Dodson has said in regard to physicians in industry practising medicine. I don't think it is well to agree with all he says because, if we all did agree, then there would be no progress. I have been interested in industrial medicine for about sixteen years. I began my practice in a mining camp out in New Mexico, and there, in addition to being a physician, I was justice of the peace, recreation manager, coroner—in fact, I was everything that nobody else wanted to be. At that time my work was very general—that is, I had to look after the families in the community. I came into personal contact with every individual, not only as a physician but frequently as the justice of the peace.

When I came to Chicago I quickly found that the activity of the industrial physician was vastly different from that in the mining camp. Here he has other agencies to act with him: there he had to do the work himself. I think that most of you who know me know that I am thoroughly in accord with most of what Dr. Dodson has said to us. I believe in giving my services wherever they can be used as though a large fee were being paid. That is the standard that I have set and that I am endeavoring to maintain, but I have had another phase of the work thrust upon me. Industry is in business to make money. It is not a philanthropic organization, but it has to pay dividends. It has to pay the premium on the bonds. A great deal of the work of the industrial surgeon is looked upon as an essential, and I think that some of you will agree with me that a great deal of it has been essential. In the last two or three years there has been a decided reaction in regard to the activities of the industrial physician. A great many men doing industrial work have had to seek positions with private practice.

I think that we have been bending backwards, going just a little bit too far in our activities. As industrial physicians it is our object to build up a clientele by hygienic advice, by physical examinations, and by the education of those who consult us, especially in matters pertaining to their health. This should be the function of the physician, and as the industrial physician, not as an employee of the company. Our relationship to the man who comes into our office should be exactly the same as to the man who comes into the office of a private practitioner, except that the company is paying us a salary and we don't have to look to the patient for a fee. We should do for him the same as the country physician should do. If a man comes to us complaining of one thing and we find that he has something else, it is our duty to make him aware of that fact. If a man comes into the plant with an injury and we find that he has incipient tuberculosis, we make an examination for that and advise him. . . . Our opportunities for practising preventive medicine are much greater than those of the private physician who is waiting for the man to come back to him. A great many men come to us, because when they are sick they have to come. In that way our field, our scope of work, is larger than that of the physician in private practice.

We should never lose sight of the fact that we are not industrial physicians and surgeons. I don't like the term at all. The industrial physician is a man who might doctor in the industry. We are physicians in industry and should be considered as such, and we are improving our profession and utilizing our special knowledge in the industry. I believe that we should confine our activities mostly to our industry. The very important thing is the maintaining of healthful working conditions along with our compensation

work or our accident work which is our great function. Simply because a man is dependent upon a certain industry for his maintenance does not give the industry a right to go into his home life, but because a man is a part of the assets of that industry and upon his ability to perform his work depends the success of the industry, just so far has industry the supervision of his home life and conditions. Good health, knowledge, and ability, are the assets of the ordinary working-man. Without good health a man cannot perform his duties efficiently. Good health is therefore his chief asset: it is the commodity that he is selling to the industry and it is up to him and not up to the industry to maintain the quality of that commodity. That is speaking a little strongly, but it was an argument that I used a short time ago in putting over compulsory examinations for our executives. We have a certain amount of money tied up, invested, in the men who have been with the company for a number of years. They are the assets of the company, really more so than the products of the company, because they are the men whose knowledge and ability pay the dividends. If a man does not think enough of his own health to maintain it, he should be discharged; the company should have no further use for him. That should apply not only to the working-man. In fact, we could not carry on physical examinations for the working-men because of our seasonal work and gang work. When we need a man we need him in a hurry. We have to defer examination until some future time when we have more leisure. Consequently during the war when our turnover of labor was from 500 to 700 a day we had to abandon examination of our employees. With reference to the executives, however, we insist on physical examination, but I have asked that this examination be made compulsory. Some of the executives did not like this very well, but the measure has gone through and we are working on a plan whereby all our executives under 40 years of age will be examined once a year and all those 40 or over, twice a year. The examination will be made by their family doctor, and will be recorded upon a blank similar to that of the American Medical Association. The blank will then be sent to the medical department of the company. It will devolve upon the medical department to see that these men are examined regularly. It will also devolve on the medical department to scrutinize these blanks and, if they notice something that does not look right, to see that the man has another examination, possibly a little more in detail. That is something which we are working on now and which will be in effect by the first of August.

In our plant we have urged the employees to bring the members of their families, particularly their children, in to our department for physical examination. We believe that by educating the children we can gain better and quicker results than by trying to educate those illiterate foreign men with fixed ideas who cannot be taught anything new. They have their Old World ideas of sanitation and hygiene and they will persist in them.

Dr. Dodson referred to the organizing and teaching of first aid and home nursing and such other things in the industry. We have tried that and I cannot say that it is very successful. I think that is one of the places where we are leaning backwards. There are other agencies to do that. Probably the doctor will not agree with this, but I believe that we should co-operate with the agencies which are doing that kind of work. The Red Cross is more fitted for teaching nursing and first aid than we are. We have found in our particular industry that we cannot try to do very much for the employee. Our people are mostly foreigners and are very illiterate—in fact, of very low mentality, an average of 12 or 13 years—and if we offer or try to do things for them which are for their benefit they are very suspicious and think we have some ulterior motive. We have to be very careful indeed, therefore, even in advising them to go to the hospital when a serious injury occurs. I have sat for half an hour or an hour trying to convince a man that the hospital was the only place for him to go, and then maybe I would have to call in his brothers and sisters or an uncle or the priest before he would consent to go. Of course, we have overcome that by gaining their confidence. In fact, we are trying to take the place of the family physician, the old country doctor as you might say, in industry.

President Shoudy: Dr. Dodson, along the principle of first aid I might just tell you that we can report about 5,000 who have taken first aid at the Bethlehem plant in the last eight years. . . .

Dr. Mock: Dr. Gentles is present this afternoon and I think perhaps he would like to say a few words to us in behalf of the Red Cross.

Dr. Gentles: I should like to say that I have a great deal of sympathy with Dr. Dodson's remarks, and I have a great deal of sympathy with Dr. Cheney's remarks. In such a case as that the truth must lie between them, not all the truth to the one and not all the truth to the other. I think anybody who looks at the rates of mortality in our country here and then compares them with Great Britain will see the difference. They are all to the disadvantage of this country. We have here a polyglot population and that may be a factor. We have a tremendous turnover in our industry but the fact remains that we have a different attitude between the individual workmen in regard to these racial traits. In the last few years we who have been working with the Red Cross have come to have a very decided idea as to the value of first aid. When an industry begins to haggle with us about the hours and the cost, we know at once that we cannot do anything with that industry. But when an industry will give us the executives to work with and will allow us to pick the men who are to do the teaching, etc., then we can get results that we cannot get in any other way.

In going around the country as a sort of salesman for first aid in life saving I find that in many cases the older doctor cannot adjust himself to the feeling that he is dealing with men who are well. He wants to go back into that

little old cubby-hole smelling of iodoform. He can't crawl out into the light and deal with the well man. The result is that executives in those organizations simply never think of their health.

Where does the call come from for first aid? As a rule it comes from the superintendent or from the foreman, the man who has to deal with accidents. Nearly always when I come to an industry where first aid has been started the executives will tell me how many beds they have, how much they have spent on those, etc. Then I go to the safety man and he tells me that they have to carry the men down there to the hospital. The days when the men are treated and thought of as hunks and guineas is past. . . . Not long ago one of the industries here asked me what supplies they should put in, and I told them a blanket and stretcher and one or two dressings. These should be placed in the locker and the key turned over to the man who is on duty there and that man held responsible; when he quits the post he should turn the key over to the man who relieves him. The medical man criticized that very much. He said, "We have not had an accident here for three years."

I said, "If you were a working-man and it was a snowy day and you got caught between two wagons and were picked up and left on a loading station for three-quarters of an hour or an hour until an ambulance got there, would you like it?"

He said, "No."

"Well," I said, "then why should the workingman like it any better?"

Then he said, "Well, but how about the expense? How can I justify the expense if there is an accident?"

That was his belief, and that is the belief of a great number of medical men.

In Chicago today we are turning out over 100 life savers every month. This is done by myself on part time with the aid of a full-time secretary. It represents a 100 per cent. increase from a year ago. When we go into an industry the first thing we do is to ask for an executive in that industry who is the key man through whom we apply. It is his business to see that details are arranged in regard to the classes, that the men are sent down there on time, etc. The second thing is to get a medical man who can do the work. That man comes from the industry. We make it our business to pay the man and make the industry pay us. Today in Chicago we do not have a single class where the medical man is not paid, and we do not have a single place where the examiner is paid.

I think the employer today is beginning to realize that these things should come into industry. If the medical man shuts the door, then the men come to me. The safety man comes to me, the foreman comes to me, and the industrial relations man comes to me, and thus put it over the head of the medical man. That is not right. It is a pity. I should like to see the medical man in every case heading up that work. How is he going to get more out of his firm for the extra work? I should like to solve that question for him, but I believe that the more valuable he makes his work the more quickly he is going to get the raises.

President Shoudy: I want to thank the men who have helped us in our program today who do not belong to the Association. . . . If there is no further discussion on Dr. Dodson's paper, he may have the floor in closing the discussion.

Dr. Dodson: There is just one thing that I should like to say. It is a matter of great importance whether an employer is short-sighted or long-sighted, and it is your business to make him long-sighted. There is nothing within reason that can be done to promote the health and welfare and efficiency of the worker that is not going to help the employer. Sometimes he cannot see that until the dollars and cents come in to him. That cannot be guaranteed. It may take two or three years before your program of health betterment yields returns but it does yield returns if it is properly conducted and it is your function to make him see it, and I think this can be done.

. . . . . .

Morning Session

Tuesday, June 10, 1924

President Shoudy: The next paper is by Dr. James Britton of the International Harvester Company and Director of the Municipal Tuberculosis Sanitarium of Chicago. His subject is "Silicosis."

Dr. Britton read his prepared paper.

President Shoudy: The discussion of Dr. Britton's paper will be opened by Dr. Ethan Allen Gray of Chicago.

Dr. Gray: . . . I have been quite interested in the work of silicosis because I have had the end-result, the wreckage, for a good many years from the International Harvester Company. The diagnoses have almost always ended in "osis"—tuberculosis, or silicosis, or something else. I wish I knew how early we might get signs covering these diseases. We can get signs, I am sure, when we get the case late enough. I think it is for the physicians who are looking after the employees to tell how early they can get them. The action on the chest is first the filling up, and dilated chest in pneumonic silicosis is, I think, typical. The chest is in such condition that from the front to the back the head sits in the middle of the chest instead of sitting in its proper position. While the chest is large the arm is relatively small, and the men are small, that is, to a certain degree. The breast sounds in the absence of the tuberculous deposits are very faint, and there are faint heart sounds.

I find that there are two reasons for this. If you will listen to the heart of any person whose chest is enlarged you will find the heart further away and the sound decreases with the square of the distance. Then we have the absence of sounds and the presence of respiratory murmur, and that is of vital importance in the diagnosis. Given a man who has a chest sufficiently large and who has given no symptomatic evidence of his disabilities, the temptation on the part of many physicians is to say that there is nothing the matter with him. But you will find that such a

man has forgotten long since how to run, he does not hurry because he cannot, he hasn't lung enough to hurry. In the diagnosis of pulmonary tuberculosis we begin to find signs which are definite and they are one-sided. The breath sounds and the respiratory sounds are definitely and absolutely bilateral beginning from the top down.

The end-result of these cases seems to be something like this, and what Dr. Britton has told us is something new to me: there are men at the fresh air hospitals who have been away from the field of work for one or two years and yet they die. The postmortem is held and the bodies are taken away, and we cannot stop them. If more of these men could be autopsied we could determine much more about these matters.

I should like to say that I agree absolutely with Dr. Britton in his statements about the grinders. I think that twelve years after one once goes on a grinding wheel is very liberal; I think even ten years is liberal. The trouble is a man can come to his position and be beyond suspicion as far as his willingness to work is concerned: when the man must slow down because he cannot walk fast or cannot carry on as he could before, he is suspected of an injury and we find that he is on the last leg of his industrial career. That is not likely to occur in an industry where the physician knows anything at all about silicosis.

A short time since I had the pleasure of reading an article on silicosis, in which the author gave as the cause the fact that white blood cells have difficulty in taking up the atoms of silica and cannot take care of it. They can take up the carbon, however, and that is the reason why a coal miner can live longer—the white cells protect him. I think we might study at the same time the accidents in the mines, for instance, and find that a great many of the miners do not die of tuberculosis because the carbon protects them and prevents development of the disease. However, I have not been able to see it.

Another thing we ought to do is protect the men who run the wet grinding wheels. With all due courtesy to Dr. Britton's paper, a number of years ago I had an opportunity to study the grinding operations in the Harvester Company, and I discovered that there was no dust. One of the days I went there was a very hot day and I enjoyed standing in the current of air produced by the revolving wheel. I took one of the spatter cards and held it up to my face in different positions and when I examined the card I found it all spattered with this spray. So I find that even in the wet grinding and under the best of conditions the grinders have to inhale a great deal of mud. I believe that is one of the things that we should bear in mind. The more I see of those cases the less I think there is anything to do except put a man on the job early enough so that he can keep well posted on the worker's health.

President Shoudy: This paper is now open for discussion. . . .

Dr. Colcord (Carnegie Institute): The paper of Dr. Britton was very interesting and especially the pictures of the lungs. I have taken many pictures of the lungs of workers around the Pittsburgh district and most all of them have more or less mottling. I have made some diagnoses as tuberculosis where they should have been fibrosis or silicosis or perhaps carbon lung. I think I have learned something this morning from those lungs. In one lung where there was no evidence of infection there was a tuberculous gland, and I should like to ask Dr. Britton when he said this lung was not infected what methods he used to find out. How does he know that tuberculosis has not already entered those lungs?

Some years ago I made an examination of a man who was an ax grinder in a mill of 5,000 employees, and I was told by the foreman that the average length of life among these men was five years for the wet grinder and seven years for the dry grinder. . . . Since then the working conditions of grinders have been improved by guards and their home life has also been very much improved so that I do not know what the present average length of life is.

The question of carbon particles and silica particles has been worked out by Dr. Drinker of Harvard and he tells me that lung phagocytes have four times the carrying power to carry out the carbon particles that they have to carry out the silica particles. It is a question of surface attraction of those two particles. The methods by which nature carries off those particles are very interesting.

In the hemlock regions I believe that the bark dust in the lungs protects against tuberculosis. It seems to me from my own experience among the coal miners that we as a profession overestimate the bad effects of carbon in the lungs.

Dr. E. R. Hayhurst (Ohio State University): Dr. Britton has a method of forcefulness of statement and presentation that makes one hang on every word. I have been studying the subject of silicosis for the past year with a view to determining whether it merits consideration for compensation. Hence you can see that I have of necessity gone pretty deeply into the subject and have tried to get as much literature dealing with the subject as I could.

There are two types of workers that were not mentioned in this paper—the monument worker and the flint worker. Winslow and Greenburg in one of the Public Health Reports reported that in an ax factory where they used flint, the flint particles, according to analyses made by the Palmer method, numbered 12,000,000 to the cubic foot. According to some of the South African records, the duration of the cases of silicosis among the Scotchmen who went down there to get rich quick is, on the average, three and one-half years. The percentage of silica in the stone is a factor which the British have investigated, and in their law for compensation they specified that the material worked upon must have 80 per cent. silica. That practically limited their compensation cases to workers in the ganister mines in northwest Yorkshire, employing about 2,500 men. Then they made a list of the industries in

which silicosis might be expected. This included the industries mentioned here and in addition abrasive and pottery work. This was published in the first British report following the Act of 1918. I abstracted it in the *American Journal of Public Health*.

I think they investigated the percentage of silica in one of the marble quarries in Vermont—marble is acknowledged to be about the highest producer of silicosis in this country—and found that it was only 68 per cent. If these British figures obtained throughout this country this particular mine would be eliminated because it did not produce enough silica.

I took the matter up with the local radiologists at Columbus, Ohio, and one of the men said he had never seen a case of silicosis to his knowledge. Another one said he had seen three or four cases. We have a lot of sand blasting there but I don't know just what the outcome is. In the northern part of the state where they have the great grindstone quarries we might, I believe, find a higher percentage of silicosis.

In these British works there were 2,500 workers and after five years 220 of them were suffering from silicosis. The silica appears to be a substance which produces a local reaction similar to an irritant which they consider to be in the nature of a toxin which maintains an irritation, and appears to be something which the leukocytes do not want to attack. . . . There are four central points that go to make up the diagnosis: the presence of radiographic findings, the presence of silica in the sputum, symptoms without fever, and the fact that the patient worked in a dust of high silica content.

In the question of tuberculosis, that is purely a complication that exists more frequently in the coal miners, according to studies I have made, and the death rate from tuberculosis among coal miners is 14 per cent. The British remove the men from the industry as soon as they are found to be suffering from this disease.

Dr. Hourigan (Larkin Company, Buffalo, N. Y.): I have been very much interested in silicosis for the last two or three years, and we have had some experiences in New York that I think the other members ought to know about. Although I find silicosis all through New York there are many who do not know what I am talking about when I make mention of it. I think, as Dr. Britton says, that it is far more prevalent than we think it is. It is found in many factories and the workers are growing old and dying before their time. We first found increased bronchial breathing and some evidence of developed tissue or foreign substance in the lungs. Then we began to watch things more closely and we found a great deal of silicosis. Then we took up the employment end of the proposition, and we found men looking for the pension jobs.

We did not know just where to meet the problem. Then we were invited down to Albany by one of the representatives in the state of New York. We went down to the legislature and told them that we thought silicosis too prevalent and that so little was known about it as yet that the best way to handle it was to make it compensable. Since then the generals of industry have found that silicosis is a very prevalent thing, and although the measure was put off this year I think that we will make it one of the laws the next time.

Dr. Otto Geier (Cincinnati, Ohio): After having been associated with this organization for the past ten years and knowing what it has done for industry, the question I raise now is how can we as a group of physicians here bring to bear such knowledge to the leaders of the medical profession, of the hospitals and of the teaching institutions, that knowledge of occupational disease in our factories, to the end that the profession at large may do much research in industry? In other words what can this group do to bring forward the tremendous importance of the work of the industrial physician? Certainly the industry cannot be looked to to produce research work.

Taking up the matter of silicosis, there is no doubt that the use of the grinding wheel is going to be increased. Within the next ten years the grinding wheel will be used to twice the degree it is today. There are new means of grinding metal coming into use every day that have opened up a new field for the grinding wheel.

Industry is rather embarrassed by frequently taking the position that there is at the present time entirely too much attention paid to research work and too little application of medicine. Knowledge is something like fifteen years ahead of application. Here are the producers who are, after all, responsible for the ability of this country to compete with Europe, and production is going to be very much increased during the next ten years. The physician must help to solve the increased productive capacity of the average working-man. It is not a problem of research work alone. The question is, what can we do to get a new medical perspective?

. . . . . .

President Shoudy: Dr. Britton, have you anything to say in closing the discussion of your paper?

Dr. Britton: There were one or two questions asked. I knew there was silicosis and lots of it, but I did not find the tuberculosis bacillus. I believe my statement was that a great majority of these men eventually develop tuberculosis and die.

Just a word about coal miners. I have not seen a great many coal miners except the ex-coal miners who come to Chicago and go to work for us. I have a suspicion that the degree of trouble they have in their chests is in proportion to the amount of stone they are associated with in the mining of coal. That is just my own notion, but you will find, if you will analyze your cases, that you get comparatively few from some mines or districts while from other districts you get a number of cases; I think it is due to the amount of stone they come in contact with.

There is just one point that I wish to impress upon you. There are lots of jobs in which silicosis is produced, like mining and quarrying, where it is hard to control the operation or very

difficult to protect the man, but in the average industry, in the factories where a few grinding wheels are used or where there is some sand blasting, it is perfectly possible and it is the urgent duty of the industrial surgeon and physician to see that that job is protected. There are plenty of mechanical means of protecting the men. It is your duty to take care of this silicosis and see that there is not any more of it. Even if you started now it would take a number of years to eliminate it, but it is possible and it ought to be done.

President Shoudy: The next paper is on "Nerve Injuries," by Dr. J. H. Lewis, Buffalo, New York.

Dr. Lewis read his prepared paper. . . .

President Shoudy: The discussion of Dr. Lewis' paper will be opened by Dr. Lewis J. Pollock of Chicago, to whom most of you need no introduction.

Dr. Pollock: Mr. President and Gentlemen: Treatment of lesions of the nerves depends on the diagnosis and especially as to where pressure is effected and to what degree the nerve is wedged in between the opposing factors. The lesions may be divided into two types: those which are severe and those which are not. In both instances we tell whether or not the nerve has been severed by the complete loss of function or the partial loss. In the case of a severe lesion we have a loss of all function of the nerve, with paralysis. From a practical standpoint, therefore, we must determine whether we have complete loss of the function of the particular nerve. Until one is familiar with all this he is frequently liable to make a mistake in the diagnosis.

We have done some wonderful work along the line of nerve injuries. One case of McKenzie's comes to my mind just now—a case of sciatic nerve suture in which there was a recovery. Mitchell, in the late war, found that frequently the patient was able to withstand pin pricks in the nerve, and he stated then that it was difficult if not impossible to explain why there was numbness in the median nerves. It was found that they had a severance of three of the nerves in the forearm. It seems that there is a certain supplementary supply in these adjacent overlapping nerves throughout the body which assists in the recovery from these injuries, but we have never been able entirely to map out this overlapping power of the nerves.

After a careful suture of the median nerve we sometimes find that there has been an adjustment and that the radial nerve has taken over its function. Every nerve has a certain very definite loss of motion, a certain definite motility, and an isolated supply. It takes only one or two supplemental motions to be able to determine whether or not the nerve is completely severed.

In dealing with the median nerve there are three signs that determine whether or not the individual is able to flex the thumb: the position the hand will assume, the position of the palm so that the index finger and the thumb will be set this way (illustrates), and so that with the thumb and index fingers it will produce an "o." The short adductor of the thumb is so placed that the individual will be able to flex the thumb and the index finger.

Musculospiral lesion is easier to understand, but testing of the extension of the finger or the hand, as Dr. Lewis brought out, must be done with the wrist in extension. But the wrist must be cocked up in this position, and if the patient can then flex the finger, the musculospiral nerve is intact. If the patient is able to withstand a pin prick, we know we are dealing with a severe lesion, but if he can feel any sensation at all, we know we are dealing with a partial lesion of the musculospiral nerve.

. . . . . .

Afternoon Session

Tuesday, June 10, 1924

President Shoudy: . . . As you know there was some discussion that we had to leave off this morning on account of our time being limited. We have the discussion of Dr. Lewis' paper on nerve injuries and have some questions on silicosis. . . . The first discussion will be on silicosis. There was some question about the protection of the worker. Will you take that matter up for us, Dr. Fisk?

Dr. Fisk: I can give you the one big thing that the Harvester Company has done in eliminating the danger of silicosis. We have practically eliminated the wet grindstone. Quite a number of years ago the master mechanic invented what is known as the Osterholm grinder. Briefly, it consists of a much smaller stone—one about 3 feet in diameter and about 6 inches in thickness—and the water is supplied from beneath. It is very economical in that one operator, instead of using just the one stone as was the custom in the old days, can now use four stones.

Its chief use with us is in facing and beveling the grain knives. We had quite a time in going over to the Osterholm grinder. At first they said that no mechanical grinder could be invented that would bevel the knives and not burn them, but Osterholm proved to them that that was wrong. It was quickly admitted that the Osterholm grinder beveled the grain knives better than a man could do by hand. Then the question of facing the knives came up and they said that that was even a more important and difficult thing to do, and that it could not possibly be done. Osterholm, in six months, perfected a wheel that would face the knives. And now the men do not handle the knives at all. They simply watch the rack of knives to be worked and when the supply is about out they put in some other ones and see that the water supply is all right—that is all there is to it.

We have tried the suggestions made this morning of holding the pad up to the worker's face. We held the spatter card to the worker's face and in many other positions and directions and even with a low power microscope we have been unable to detect any spatters on the card. That is one big thing, Mr. President, that we have done—we have eliminated the large grindstone. We feel that we are still a long way from perfection but we have certainly improved in that respect.

Question: What do you do in the other operations that are not standardized?

Dr. Fisk: We use the wet grindstone in cases other than facing and beveling, and, too, some work is done on emery stones. We have done all that we can toward the protection of the workers. The men wear goggles to protect the eyes. We do not ask them to wear respirators. Our great menace has not been in the wet stone but in the dry stone.

President Shoudy: Dr. George, will you tell us something about the sand blasting in the Packard plant?

Dr. George: The improvements in sand blasting have come about only in the last few years. Until a few years ago men did not stay on this work very long. Then the safety department got busy and for a time the men wore helmets. Our silicosis developed, I think, in the sand blasting works. We have, of course, quite a lot of sand blasting in the manufacture of automobiles, the fenders and various other parts requiring the blasting. At the present time the work is being done mostly by men wearing helmets. Certain small pieces, however, are done in small rooms that have a canvas screen with a glass window in it; the worker reaches his hand inside and is protected by the canvas screen. Our object in this case is to do away with the helmet. The large pieces that are to be sand blasted are placed on turntables in this canvas room and then the work is done along the same lines as the smaller pieces.

During the past year one worker with silicosis plus tuberculosis died and that started a very strenuous drive on the subject. With the assistance of Dr. Hinkle we took the workers who had been in that work for over two months and made X-rays of their chests. As a result of that work I think Dr. Hinkle has carried the work to other parts of the city. He has not finished his work as yet, but when he does it will be sent to headquarters, and I think it might be well to have it distributed or perhaps published in the JOURNAL OF INDUSTRIAL HYGIENE.

Dr. L. R. Thompson (U. S. Public Health Service, Washington, D. C.) We have gone into the industrial health problem, and have taken the greater industrial hazards up from a general study of four groups of workers. Dr. Flowers and a research investigator have taken this up in Pennsylvania and in Hagerstown, Maryland. These studies will cover cement dust, hard coal dust, metal polishes and silica dust, and we may be able to take vegetable dust. We are carrying on a physical examination of all the workers which includes X-ray examinations, sickness records over a period of two years, and accident records.

President Shoudy: Are there any more questions or comments on the subject of silicosis? If not, we will take up next the discussion of Dr. Lewis' paper on nerve injuries. Does anybody wish to discuss Dr. Lewis' paper?

Dr. Fisk: I was very much interested in the statement which Dr. Pollock made about the wrist drop cases. In my three months' work at the front during the war I think I worked over as many as eighteen or twenty patients with gunshot wounds and there was a marked wrist drop; that goes to prove the truth of Dr. Pollock's statement.

Dr. Benedict: I was very much interested in Dr. Lewis' paper. He apologized for going at length into that one case. I don't think I should have apologized for that because it is a very unusual thing to perform the operation that he did, and I can assure you that it was very difficult. I happened to have one case of that kind in which a tree fell and struck a man on the shoulder and he had a paralyzed shoulder immediately. I made no attempt to put the nerve back into position because I did not think there was much use in doing so, as, of course, he was paralyzed and perhaps always would be. . . .

President Shoudy: Is there any other discussion?

Dr. Schram: I was very much interested in that paper. I have had no cases of nerve injuries of this kind coming through successfully. I have had only a few, of course, but the problem that I have is a question of what to do with the injured nerves. I have a case like that now. The skin was not broken and whether the arm is fractured and the musculospiral nerve broken, I do not know as yet. There is some scar tissue in there and it was a crushing injury. It has been running some eight or ten weeks and I would like to know how to handle it.

President Shoudy: If there is no further discussion we will have Dr. Lewis close the discussion on his paper.

Dr. Lewis: I want to thank Dr. Benedict for his comments. I was very much interested in hearing his case.

In regard to the last question just asked, if that time has elapsed and there are still those symptoms of infection of the nerve it would seem to me that it would be advisable to cut down on the nerve immediately and investigate the conditions. It can do no harm and on the other hand it may do a world of good.

BOOKS RECEIVED

Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interest of our readers and as space permits.

THE ROMANCE OF A LIVING TEMPLE: A STUDY OF THE HUMAN BODY. By *Frederick M. Rossiter*, B.S., M.D., L.C.R.P., M.R.C.S., London; Author of "Practical Guide to Health;" Professor of Medicine in the College of Medical Evangelists, Los Angeles, California. Cloth. Pp. 254. New York: George Sully and Company, 1924.

HOW IS YOUR HEART? INTIMATE TALKS ON THE PREVENTION OF HEART DISEASE AND ON THE CARE OF AN ALREADY DAMAGED HEART. By *S. Calvin Smith*, M.S., M.D., Author of "Heart Affections: Their Recognition and Treatment;" "Heart Records: Their Interpretation and Preparation," etc. Cloth. Pp. 202 and index. New York: Boni and Liveright, 1924.

MEDICAL AND SANITARY INSPECTION OF SCHOOLS FOR THE HEALTH OFFICER, THE PHYSICIAN, THE NURSE AND THE TEACHER. By *S. W. Newmayer*, A.B., M.D.; formerly Chief of Division of Child Hygiene; Assistant Chief Medical Inspector, Bureau of Health; Supervisor of School Medical Inspection, Philadelphia. Cloth. Pp. 454 and index. Philadelphia and New York: Lea and Febiger, 1924.

INSANITY AND LAW: A TREATISE ON FORENSIC PSYCHIATRY. By *H. Douglas Singer*, M.D., M.R.C.P. (London), Professor of Psychiatry, University of Illinois, College of Medicine; formerly State Alienist and Director of the State Psychopathic Institute of Illinois; and *William O. Krohn*, A.M., M.D., Ph.D. Author of "Practical Lessons in Psychology;" "First Book in Hygiene;" and "Graded Lessons in Physiology and Hygiene;" formerly Resident Psychologist to Kankakee State Hospital; Head of Department of Psychology at Western Reserve University, and at the University of Illinois, and Senior Fellow at Clark University. For six years Medical Juror in Cook County (Chicago) Insanity Court. Imitation leather. Pp. 416 and appendix, glossary, and index. Philadelphia: P. Blakiston's Son and Company, 1924.

PUBLIC HEALTH NURSING. By *Mary Sewall Gardner*, R.N., A.M. Director, Providence District Nursing Association; Honorary President, National Organization for Public Health Nursing. Cloth. Pp. 407 and preface, introduction, appendix, and index. Second Edition Completely Revised. New York: The Macmillan Company, 1924.

MATERNITY NURSING IN A NUTSHELL. By *Elizabeth H. Wickham*, R.N. Graduate of the Boston City Hospital, and Boston Lying-in Hospital Training School for Nurses; Former Supervisor of the Maternity Department, Lebanon Hospital, New York City; also Late Field Nurse, Maternity Center Association, New York City. Cloth. Pp. 146 and appendix, glossary, and index. Philadelphia: F. A. Davis Company, 1924.

DISEASES OF MIDDLE LIFE: THE PREVENTION, RECOGNITION AND TREATMENT OF THE MORBID PROCESSES OF SPECIAL SIGNIFICANCE IN THIS CRITICAL LIFE PERIOD. Comprising twenty-two original articles by various eminent authorities. Edited by *Frank A. Craig*, M.D. Associate Director of the Clinical and Sociological Department of the Henry Phipps Institute of the University of Pennsylvania. In two volumes. Cloth. Vol. 1, pp. 934 and index; vol. 2, pp. 903 and index. Philadelphia: F. A. Davis Company, 1924.

HOSPITAL ORGANIZATION AND OPERATION. By *Frank E. Chapman*, Director, Mount Sinai Hospital of Cleveland. Cloth. Pp. 264 and introduction and index. New York: The Macmillan Company, 1924.

FIRST STEPS IN ORGANIZING A HOSPITAL: AN EXPOSITION OF IDEALS AND PRINCIPLES INCIDENT TO THE INCEPTION AND ORGANIZATION OF A HOSPITAL. By *Joseph J. Weber*, M.A., Editor, *The Modern Hospital*. Formerly Executive Secretary, Committee on Hospitals, State Charities Aid Association of New York; Associate Director, Boston Dispensary. Cloth. Pp. 122 and preface, appendices, and index. New York: The Macmillan Company, 1924.

CANCER, HOW IT IS CAUSED; HOW IT CAN BE PREVENTED. By *J. Ellis Barker*. With an Introduction by Sir W. Arbuthnot Lane, Bart., C.B., M.S., F.R.C.S., etc., Consulting Surgeon at Guy's Hospital, London. Cloth. Pp. 478 with index. New York: E. P. Dutton and Company, 1924.

DIABETES: ITS TREATMENT BY INSULIN AND DIET. A HANDBOOK FOR THE PATIENT. By *Orlando H. Petty*, B.S., A.M., M.D., F.A.C.P., Professor of Diseases of Metabolism, Graduate School of Medicine, University of Pennsylvania; Physician in Charge of Department of Metabolism, Philadelphia General Hospital; Physician in Charge of Department of Diabetes, Memorial Hospital; Visiting Physician to Memorial Hospital, Philadelphia, Pa. Cloth. Pp. 111 with illustrations and index. Philadelphia: F. A. Davis Company, 1924.